<110>   Oosumi et al., Teruko

<120>   Solanum Bulbocastanum Late Blight Resistance Gene and Use Thereof

<130>   0155.02

<150>   60/407,100
<151>   2002-08-29

<160>   10

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Glu Ala Phe Leu Gln Val Leu Leu Asp Asn Leu Thr Cys Phe Ile Gln
        5   10   15

ggg gaa ctt gga ttg att ctt ggt ttt aag gat gag ttc gaa aag ctt   153
Gly Glu Leu Gly Leu Ile Leu Gly Phe Lys Asp Glu Phe Glu Lys Leu
    20   25   30   °

caa agc acg ttt act aca atc caa gct gtg cta gaa gat gct cag aag   201
Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala Gln Lys
35   40   45   50

aag caa ttg aag gac aag gca ata gaa aat tgg ttg cag aaa ctc aat   249
Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys Leu Asn
                55   60   65

gct gct gca tat gag gct gat gac atc ttg gac gaa tgt aaa act gag   297
Ala Ala Ala Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys Thr Glu
                70   75   80

gca cca att aga cag aag aag aac aaa tat ggg tgt tat cat cca aac   345
Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His Pro Asn
            85   90   95

gtt atc act ttt cgt cac aag att ggg aaa agg atg aaa aag att atg   393
Val Ile Thr Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys Ile Met
        100   105   110

gag aaa cta gat gta att gca gcg gaa cga att aag ttt cat ttg gat   441
Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His Leu Asp
115   120   125   130

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gaa agg act ata gag aga caa gtt gct aca cgc caa aca ggt ttt gtt        489
Glu Arg Thr Ile Glu Arg Gln Val Ala Thr Arg Gln Thr Gly Phe Val
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ttg aat gaa cca caa gtt tat gga aga gac aaa gaa aag gac gag ata        537
Leu Asn Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp Glu Ile
                150                 155                 160

gtg aaa atc ctg ata aac aat gtt agc aat gcc caa aca ctt cca gtc        585
Val Lys Ile Leu Ile Asn Asn Val Ser Asn Ala Gln Thr Leu Pro Val
                165                 170                 175

ctc cca ata ctt ggt atg ggg gga cta gga aag acg act ctt gcc caa        633
Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala Gln
                180                 185                 190

atg gtc ttc aat gat cag aga gta att gag cat ttc cat ccc aaa ata        681
Met Val Phe Asn Asp Gln Arg Val Ile Glu His Phe His Pro Lys Ile
195                 200                 205                 210

tgg att tgt gtc tcg gaa gat ttt aat gag aag agg ttg ata aag gaa        729
Trp Ile Cys Val Ser Glu Asp Phe Asn Glu Lys Arg Leu Ile Lys Glu
                215                 220                 225

att gta gaa tct att gaa gaa aag tca ctt ggt ggc atg gac ttg gct        777
Ile Val Glu Ser Ile Glu Glu Lys Ser Leu Gly Gly Met Asp Leu Ala
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cca ctt caa aag aag ctt cgg gac ttg ctg aat gga aaa aaa tat ttg        825
Pro Leu Gln Lys Lys Leu Arg Asp Leu Leu Asn Gly Lys Lys Tyr Leu
                245                 250                 255

ctc gtc tta gat gat gtt tgg aat gaa gat caa gat aag tgg gct aag        873
Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Asp Lys Trp Ala Lys
                260                 265                 270

tta aga caa gtc ttg aag gtt gga gca agt ggc gct tct gtt cta acc        921
Leu Arg Gln Val Leu Lys Val Gly Ala Ser Gly Ala Ser Val Leu Thr
275                 280                 285                 290

act act cgt ctt gaa aag gtt gga tca att atg gga aca ttg caa cca        969
Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr Leu Gln Pro
                295                 300                 305

tat gaa ttg tca aat ttg tct caa gaa gat tgt tgg ttg ttg ttc atg       1017
Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu Leu Phe Met
                310                 315                 320

caa cgt gca ttt ggg cac caa gaa gaa ata aat ctt aat ctt gtg gct       1065
Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Leu Asn Leu Val Ala
                325                 330                 335

atc gga aag gag att gtg aaa aaa tgt ggt ggt gtg cct cta gca gct       1113
Ile Gly Lys Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu Ala Ala
                340                 345                 350

aaa act ctt gga ggt att ttg cgc ttt aag aga gaa gaa aga cag tgg       1161
Lys Thr Leu Gly Gly Ile Leu Arg Phe Lys Arg Glu Glu Arg Gln Trp
355                 360                 365                 370
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gaa cat gtg aga gat agt gag att tgg aaa ttg cct caa gaa gaa agt        1209
Glu His Val Arg Asp Ser Glu Ile Trp Lys Leu Pro Gln Glu Glu Ser
                375                 380                 385

tct att ctg cct gcc ctg aga ctt agt tac cat cac ctt cca ctt gat        1257
Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His His Leu Pro Leu Asp
                390                 395                 400

ttg aga caa tgc ttt aca tat tgt gca gta ttc cca aag gat acc gaa        1305
Leu Arg Gln Cys Phe Thr Tyr Cys Ala Val Phe Pro Lys Asp Thr Glu
                405                 410                 415

atg gaa aag gga aat cta atc tct ctc tgg atg gca cat ggt ttt att        1353
Met Glu Lys Gly Asn Leu Ile Ser Leu Trp Met Ala His Gly Phe Ile
                420                 425                 430

tta tcg aaa gga aac ttg gag cta gag aat gta ggt aat gaa gta tgg        1401
Leu Ser Lys Gly Asn Leu Glu Leu Glu Asn Val Gly Asn Glu Val Trp
435                 440                 445                 450

aat gaa tta tac ttg agg tct ttc ttc caa gag att gaa gtt aaa tct        1449
Asn Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val Lys Ser
                455                 460                 465

ggt caa act tat ttc aag atg cat gat ctc att cat gat ctg gca aca        1497
Gly Gln Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu Ala Thr
                470                 475                 480

tct cta ttt tcg gca agc aca tca agc agc aat atc cga gaa ata att        1545
Ser Leu Phe Ser Ala Ser Thr Ser Ser Ser Asn Ile Arg Glu Ile Ile
                485                 490                 495

gta gaa aat tac ata cat atg atg tcc att ggt ttc act aaa gtg gta        1593
Val Glu Asn Tyr Ile His Met Met Ser Ile Gly Phe Thr Lys Val Val
    500                 505                 510

tct tct tac tct ctt tcc cac ttg cag aag ttt gtc tcg ttg agg gtg        1641
Ser Ser Tyr Ser Leu Ser His Leu Gln Lys Phe Val Ser Leu Arg Val
515                 520                 525                 530

ctt aat cta agt gac ata aaa ctt aag cag tta ccg tct tcc att gga        1689
Leu Asn Leu Ser Asp Ile Lys Leu Lys Gln Leu Pro Ser Ser Ile Gly
                535                 540                 545

gat cta gta cat tta aga tac cta aac ttg tct ggc aat act agt att        1737
Asp Leu Val His Leu Arg Tyr Leu Asn Leu Ser Gly Asn Thr Ser Ile
                550                 555                 560

cgt agt ctt cca aac cag tta tgc aag ctt caa aat ctg cag act ctt        1785
Arg Ser Leu Pro Asn Gln Leu Cys Lys Leu Gln Asn Leu Gln Thr Leu
                565                 570                 575

gat cta cat ggc tgt cat tca ctt tgt tgt ttg cca aaa gaa aca agc        1833
Asp Leu His Gly Cys His Ser Leu Cys Cys Leu Pro Lys Glu Thr Ser
                580                 585                 590

aaa ctt ggt agt ctt cga aat ctt tta ctt gat ggt tgc tat gga ttg        1881
Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Cys Tyr Gly Leu
595                 600                 605                 610

act tgt atg cca cca agg ata gga tct ttg aca tgc ctt aag act cta        1929
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Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys Thr Leu
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agt aga ttt gtg gtg gga att cag aag aaa agt tgt caa ctt ggt gaa        1977
Ser Arg Phe Val Val Gly Ile Gln Lys Lys Ser Cys Gln Leu Gly Glu
             630                       635                 640

tta cga aac ctg aat ctc tat ggc tca att gaa atc acg cat ctt gag        2025
Leu Arg Asn Leu Asn Leu Tyr Gly Ser Ile Glu Ile Thr His Leu Glu
             645                       650                 655

aga gtg aag aat gat atg gat gca aaa gaa gcc aat tta tct gca aaa        2073
Arg Val Lys Asn Asp Met Asp Ala Lys Glu Ala Asn Leu Ser Ala Lys
             660                       665                 670

gaa aat ctg cat tct tta agc atg aaa tgg gat gac gat gaa cgt cca        2121
Glu Asn Leu His Ser Leu Ser Met Lys Trp Asp Asp Asp Glu Arg Pro
675                       680                 685                 690

cgt ata tat gaa tca gaa aaa gtt gaa gtg ctt gaa gct ctc aaa cca        2169
Arg Ile Tyr Glu Ser Glu Lys Val Glu Val Leu Glu Ala Leu Lys Pro
                 695                       700                 705

cac tcc aat ctg act tgt tta aca atc agg ggc ttc aga gga atc cgt        2217
His Ser Asn Leu Thr Cys Leu Thr Ile Arg Gly Phe Arg Gly Ile Arg
             710                       715                 720

ctc cca gac tgg atg aat cac tca gtt ttg aaa aat gtt gtc tct att        2265
Leu Pro Asp Trp Met Asn His Ser Val Leu Lys Asn Val Val Ser Ile
             725                       730                 735

gaa atc atc agt tgc aaa aac tgc tca tgc tta cca ccc ttt ggt gag        2313
Glu Ile Ile Ser Cys Lys Asn Cys Ser Cys Leu Pro Pro Phe Gly Glu
             740                       745                 750

ctg cct tgt cta aaa agt cta gag ttg tgg agg ggg tct gcg gaa gtg        2361
Leu Pro Cys Leu Lys Ser Leu Glu Leu Trp Arg Gly Ser Ala Glu Val
755                       760                 765                 770

gag tat gtt gat tct gga ttc cct aca aga aga agg ttt cca tct ctg        2409
Glu Tyr Val Asp Ser Gly Phe Pro Thr Arg Arg Arg Phe Pro Ser Leu
                 775                       780                 785

aga aaa ctt aat ata cgc gaa ttt ggt aat ctg aaa gga ttg ctg aaa        2457
Arg Lys Leu Asn Ile Arg Glu Phe Gly Asn Leu Lys Gly Leu Leu Lys
             790                       795                 800

aag gaa gga gaa gag caa tgc cct gtg ctt gaa gag ata gag att aaa        2505
Lys Glu Gly Glu Glu Gln Cys Pro Val Leu Glu Glu Ile Glu Ile Lys
             805                       810                 815

tgt tgc cct atg ttt gtt att cca acc ctt tct tct gtc aag aaa ttg        2553
Cys Cys Pro Met Phe Val Ile Pro Thr Leu Ser Ser Val Lys Lys Leu
             820                       825                 830

gta gtt agt ggg gac aag tca gat gca ata ggt ttc agt tcc ata tct        2601
Val Val Ser Gly Asp Lys Ser Asp Ala Ile Gly Phe Ser Ser Ile Ser
835                       840                 845                 850

aat ctc atg gct ctt act tcc ctc caa att cgc tat aac aaa gaa gat        2649
Asn Leu Met Ala Leu Thr Ser Leu Gln Ile Arg Tyr Asn Lys Glu Asp
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gct tca ctc cca gaa gag atg ttc aaa agc ctt gca aat ctc aaa tac        2697
Ala Ser Leu Pro Glu Glu Met Phe Lys Ser Leu Ala Asn Leu Lys Tyr
        870                     875                     880

ttg aat atc tct ttt tac ttc aat ctt aaa gag ctg cct acc agc ctg        2745
Leu Asn Ile Ser Phe Tyr Phe Asn Leu Lys Glu Leu Pro Thr Ser Leu
        885                     890                     895

gct agt ctc aat gct ttg aag cat ctg gaa att cat agt tgt tat gca        2793
Ala Ser Leu Asn Ala Leu Lys His Leu Glu Ile His Ser Cys Tyr Ala
        900                     905                     910

cta gag agt ctc ccc gag gaa ggt gtg aaa ggt tta att tca ctc aca        2841
Leu Glu Ser Leu Pro Glu Glu Gly Val Lys Gly Leu Ile Ser Leu Thr
915                     920                     925                 930

cag tta tcc ata aca tac tgt gaa atg cta caa tgt tta ccg gag gga        2889
Gln Leu Ser Ile Thr Tyr Cys Glu Met Leu Gln Cys Leu Pro Glu Gly
                935                     940                     945

ttg cag cac cta aca gcc ctc aca aat tta tca gtt gag ttt tgt cca        2937
Leu Gln His Leu Thr Ala Leu Thr Asn Leu Ser Val Glu Phe Cys Pro
                950                     955                     960

aca ctg gcc aag cgg tgt gag aag gga ata gga gaa gac tgg tac aaa        2985
Thr Leu Ala Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp Tyr Lys
        965                     970                     975

att gct cac att cct cgt gtg ttt att tat tag tattcccaat tagatgtaat      3038
Ile Ala His Ile Pro Arg Val Phe Ile Tyr
        980                     985

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            20                  25                  30


Lys Leu Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala
        35                  40                  45


Gln Lys Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys
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Leu Asn Ala Ala Ala Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys
65   70   75   80

Thr Glu Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His
                85   90   95

Pro Asn Val Ile Thr Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys
            100   105   110

Ile Met Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His
        115   120   125

Leu Asp Glu Arg Thr Ile Glu Arg Gln Val Ala Thr Arg Gln Thr Gly
    130   135   140

Phe Val Leu Asn Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp
145   150   155   160

Glu Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asn Ala Gln Thr Leu
            165   170   175

Pro Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu
            180   185   190

Ala Gln Met Val Phe Asn Asp Gln Arg Val Ile Glu His Phe His Pro
        195   200   205

Lys Ile Trp Ile Cys Val Ser Glu Asp Phe Asn Glu Lys Arg Leu Ile
    210   215   220

Lys Glu Ile Val Glu Ser Ile Glu Glu Lys Ser Leu Gly Gly Met Asp
225   230   235   240

Leu Ala Pro Leu Gln Lys Lys Leu Arg Asp Leu Leu Asn Gly Lys Lys
            245   250   255

Tyr Leu Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Asp Lys Trp
            260   265   270

Ala Lys Leu Arg Gln Val Leu Lys Val Gly Ala Ser Gly Ala Ser Val
    275   280   285

Leu Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr Leu
    290   295   300

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Gln Pro Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu Leu
305             310             315             320

Phe Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Leu Asn Leu
            325             330             335

Val Ala Ile Gly Lys Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu
            340             345             350

Ala Ala Lys Thr Leu Gly Gly Ile Leu Arg Phe Lys Arg Glu Glu Arg
            355             360             365

Gln Trp Glu His Val Arg Asp Ser Glu Ile Trp Lys Leu Pro Gln Glu
    370             375             380

Glu Ser Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His His Leu Pro
385             390             395             400

Leu Asp Leu Arg Gln Cys Phe Thr Tyr Cys Ala Val Phe Pro Lys Asp
            405             410             415

Thr Glu Met Glu Lys Gly Asn Leu Ile Ser Leu Trp Met Ala His Gly
            420             425             430

Phe Ile Leu Ser Lys Gly Asn Leu Glu Leu Glu Asn Val Gly Asn Glu
            435             440             445

Val Trp Asn Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val
    450             455             460

Lys Ser Gly Gln Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu
465             470             475             480

Ala Thr Ser Leu Phe Ser Ala Ser Thr Ser Ser Ser Asn Ile Arg Glu
            485             490             495

Ile Ile Val Glu Asn Tyr Ile His Met Met Ser Ile Gly Phe Thr Lys
            500             505             510

Val Val Ser Ser Tyr Ser Leu Ser His Leu Gln Lys Phe Val Ser Leu
            515             520             525

Arg Val Leu Asn Leu Ser Asp Ile Lys Leu Lys Gln Leu Pro Ser Ser
    530             535             540
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Ile Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Ser Gly Asn Thr
545                 550             555             560

Ser Ile Arg Ser Leu Pro Asn Gln Leu Cys Lys Leu Gln Asn Leu Gln
                565             570             575

Thr Leu Asp Leu His Gly Cys His Ser Leu Cys Cys Leu Pro Lys Glu
            580             585             590

Thr Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Cys Tyr
        595             600             605

Gly Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys
    610             615             620

Thr Leu Ser Arg Phe Val Val Gly Ile Gln Lys Lys Ser Cys Gln Leu
625             630             635             640

Gly Glu Leu Arg Asn Leu Asn Leu Tyr Gly Ser Ile Glu Ile Thr His
            645             650             655

Leu Glu Arg Val Lys Asn Asp Met Asp Ala Lys Glu Ala Asn Leu Ser
            660             665             670

Ala Lys Glu Asn Leu His Ser Leu Ser Met Lys Trp Asp Asp Asp Glu
        675             680             685

Arg Pro Arg Ile Tyr Glu Ser Glu Lys Val Glu Val Leu Glu Ala Leu
    690             695             700

Lys Pro His Ser Asn Leu Thr Cys Leu Thr Ile Arg Gly Phe Arg Gly
705             710             715             720

Ile Arg Leu Pro Asp Trp Met Asn His Ser Val Leu Lys Asn Val Val
            725             730             735

Ser Ile Glu Ile Ile Ser Cys Lys Asn Cys Ser Cys Leu Pro Pro Phe
        740             745             750

Gly Glu Leu Pro Cys Leu Lys Ser Leu Glu Leu Trp Arg Gly Ser Ala
        755             760             765

Glu Val Glu Tyr Val Asp Ser Gly Phe Pro Thr Arg Arg Arg Phe Pro
    770             775             780
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Ser Leu Arg Lys Leu Asn Ile Arg Glu Phe Gly Asn Leu Lys Gly Leu
785             790         795             800

Leu Lys Lys Glu Gly Glu Glu Gln Cys Pro Val Leu Glu Glu Ile Glu
            805             810             815

Ile Lys Cys Cys Pro Met Phe Val Ile Pro Thr Leu Ser Ser Val Lys
        820             825             830

Lys Leu Val Val Ser Gly Asp Lys Ser Asp Ala Ile Gly Phe Ser Ser
        835             840             845

Ile Ser Asn Leu Met Ala Leu Thr Ser Leu Gln Ile Arg Tyr Asn Lys
    850             855             860

Glu Asp Ala Ser Leu Pro Glu Glu Met Phe Lys Ser Leu Ala Asn Leu
865             870             875             880

Lys Tyr Leu Asn Ile Ser Phe Tyr Phe Asn Leu Lys Glu Leu Pro Thr
            885             890             895

Ser Leu Ala Ser Leu Asn Ala Leu Lys His Leu Glu Ile His Ser Cys
        900             905             910

Tyr Ala Leu Glu Ser Leu Pro Glu Glu Gly Val Lys Gly Leu Ile Ser
        915             920             925

Leu Thr Gln Leu Ser Ile Thr Tyr Cys Glu Met Leu Gln Cys Leu Pro
    930             935             940

Glu Gly Leu Gln His Leu Thr Ala Leu Thr Asn Leu Ser Val Glu Phe
945             950             955             960

Cys Pro Thr Leu Ala Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp
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Tyr Lys Ile Ala His Ile Pro Arg Val Phe Ile Tyr
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Ala Glu Ala Phe Leu Gln Val Leu Leu Asp Asn Leu Thr Cys Phe Ile
          5   10   15

caa ggg gaa ctt gga ttg att ctt ggt ttt aag gat gag ttc gaa aag   155
Gln Gly Glu Leu Gly Leu Ile Leu Gly Phe Lys Asp Glu Phe Glu Lys
          20   25   30

ctt caa agc acg ttt act aca atc caa gct gtg cta gaa gat gct cag   203
Leu Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala Gln
          35   40   45

aag aag caa ttg aag gac aag gca ata gaa aat tgg ttg cag aaa ctc   251
Lys Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys Leu
50   55   60   65

aat gct gct gca tat gag gct gat gac atc ttg gac gaa tgt aaa act   299
Asn Ala Ala Ala Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys Thr
              70   75   80

gag gca cca att aga cag aag aag aac aaa tat ggg tgt tat cat cca   347
Glu Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His Pro
              85   90   95

aac gtt atc act ttt cgt cac aag att ggg aaa agg atg aaa aag att   395
Asn Val Ile Thr Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys Ile
          100   105   110

atg gag aaa cta gat gta att gca gcg gaa cga att aag ttt cat ttg   443
Met Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His Leu
          115   120   125

gat gaa agg act ata gag aga caa gtt gct aca cgc caa aca gg   487
Asp Glu Arg Thr Ile Glu Arg Gln Val Ala Thr Arg Gln Thr Gly
130   135   140

tgctcatctt agatattttt ctgaaaaaac agctttatat catcaaattc atgtgtgttt   547

tgggaattcg tctaatctaa atgttcgtct caagtctaag tagataagtg gatccagctt   607

tggatttatt aatctattag ctaaatctgt ttagtgaagt ttttaacata tataacctca   667

gataaatcca tagcttactc ataggattag gataggcccc caagtctaaa tgacaggata   727

aagccagagt tgtttttagct cttataaatt aacaatgata ataatgtgaa ttcaaaaaag   787

tgcattttttt taatttgaaa tatttctgct gcttctcaag cttatcattg tctttttact   847

gtgcaaaatt ctactttgta tttttgctga ctcctaccga gcttgggcca gg t ttt   903
                                                             Phe
                                                             145

gtt ttg aat gaa cca caa gtt tat gga aga gac aaa gaa aag gac gag   951
Val Leu Asn Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp Glu
                150   155   160

ata gtg aaa atc ctg ata aac aat gtt agc aat gcc caa aca ctt cca   999
Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asn Ala Gln Thr Leu Pro
                165   170   175

gtc ctc cca ata ctt ggt atg ggg gga cta gga aag acg act ctt gcc   1047
Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala
                180   185   190

caa atg gtc ttc aat gat cag aga gta att gag cat ttc cat ccc aaa   1095
Gln Met Val Phe Asn Asp Gln Arg Val Ile Glu His Phe His Pro Lys
        195   200   205

ata tgg att tgt gtc tcg gaa gat ttt aat gag aag agg ttg ata aag   1143
Ile Trp Ile Cys Val Ser Glu Asp Phe Asn Glu Lys Arg Leu Ile Lys
210   215   220   225

gaa att gta gaa tct att gaa gaa aag tca ctt ggt ggc atg gac ttg   1191
Glu Ile Val Glu Ser Ile Glu Glu Lys Ser Leu Gly Gly Met Asp Leu
                230   235   240

gct cca ctt caa aag aag ctt cgg gac ttg ctg aat gga aaa aaa tat   1239
Ala Pro Leu Gln Lys Lys Leu Arg Asp Leu Leu Asn Gly Lys Lys Tyr
                245   250   255

ttg ctc gtc tta gat gat gtt tgg aat gaa gat caa gat aag tgg gct   1287
Leu Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Asp Lys Trp Ala
                260   265   270

aag tta aga caa gtc ttg aag gtt gga gca agt ggc gct tct gtt cta   1335
Lys Leu Arg Gln Val Leu Lys Val Gly Ala Ser Gly Ala Ser Val Leu
                275   280   285

acc act act cgt ctt gaa aag gtt gga tca att atg gga aca ttg caa   1383
Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr Leu Gln
290   295   300   305

cca tat gaa ttg tca aat ttg tct caa gaa gat tgt tgg ttg ttg ttc   1431
Pro Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu Leu Phe
                310   315   320

atg caa cgt gca ttt ggg cac caa gaa gaa ata aat ctt aat ctt gtg   1479
Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Leu Asn Leu Val
                325   330   335

gct atc gga aag gag att gtg aaa aaa tgt ggt ggt gtg cct cta gca   1527
Ala Ile Gly Lys Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu Ala
                340   345   350

gct aaa act ctt gga ggt att ttg cgc ttt aag aga gaa gaa aga cag   1575
Ala Lys Thr Leu Gly Gly Ile Leu Arg Phe Lys Arg Glu Glu Arg Gln
                355   360   365

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tgg gaa cat gtg aga gat agt gag att tgg aaa ttg cct caa gaa gaa       1623
Trp Glu His Val Arg Asp Ser Glu Ile Trp Lys Leu Pro Gln Glu Glu
370                 375                 380                 385

agt tct att ctg cct gcc ctg aga ctt agt tac cat cac ctt cca ctt       1671
Ser Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His His Leu Pro Leu
            390                 395                 400

gat ttg aga caa tgc ttt aca tat tgt gca gta ttc cca aag gat acc       1719
Asp Leu Arg Gln Cys Phe Thr Tyr Cys Ala Val Phe Pro Lys Asp Thr
            405                 410                 415

gaa atg gaa aag gga aat cta atc tct ctc tgg atg gca cat ggt ttt       1767
Glu Met Glu Lys Gly Asn Leu Ile Ser Leu Trp Met Ala His Gly Phe
        420                 425                 430

att tta tcg aaa gga aac ttg gag cta gag aat gta ggt aat gaa gta       1815
Ile Leu Ser Lys Gly Asn Leu Glu Leu Glu Asn Val Gly Asn Glu Val
        435                 440                 445

tgg aat gaa tta tac ttg agg tct ttc ttc caa gag att gaa gtt aaa       1863
Trp Asn Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val Lys
450                 455                 460                 465

tct ggt caa act tat ttc aag atg cat gat ctc att cat gat ctg gca       1911
Ser Gly Gln Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu Ala
                470                 475                 480

aca tct cta ttt tcg gca agc aca tca agc agc aat atc cga gaa ata       1959
Thr Ser Leu Phe Ser Ala Ser Thr Ser Ser Ser Asn Ile Arg Glu Ile
            485                 490                 495

att gta gaa aat tac ata cat atg atg tcc att ggt ttc act aaa gtg       2007
Ile Val Glu Asn Tyr Ile His Met Met Ser Ile Gly Phe Thr Lys Val
            500                 505                 510

gta tct tct tac tct ctt tcc cac ttg cag aag ttt gtc tcg ttg agg       2055
Val Ser Ser Tyr Ser Leu Ser His Leu Gln Lys Phe Val Ser Leu Arg
        515                 520                 525

gtg ctt aat cta agt gac ata aaa ctt aag cag tta ccg tct tcc att       2103
Val Leu Asn Leu Ser Asp Ile Lys Leu Lys Gln Leu Pro Ser Ser Ile
530                 535                 540                 545

gga gat cta gta cat tta aga tac cta aac ttg tct ggc aat act agt       2151
Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Ser Gly Asn Thr Ser
            550                 555                 560

att cgt agt ctt cca aac cag tta tgc aag ctt caa aat ctg cag act       2199
Ile Arg Ser Leu Pro Asn Gln Leu Cys Lys Leu Gln Asn Leu Gln Thr
            565                 570                 575

ctt gat cta cat ggc tgt cat tca ctt tgt tgt ttg cca aaa gaa aca       2247
Leu Asp Leu His Gly Cys His Ser Leu Cys Cys Leu Pro Lys Glu Thr
        580                 585                 590

agc aaa ctt ggt agt ctt cga aat ctt tta ctt gat ggt tgc tat gga       2295
Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Cys Tyr Gly
595                 600                 605
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ttg act tgt atg cca cca agg ata gga tct ttg aca tgc ctt aag act      2343
Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys Thr
610             615             620                 625

cta agt aga ttt gtg gtg gga att cag aag aaa agt tgt caa ctt ggt      2391
Leu Ser Arg Phe Val Val Gly Ile Gln Lys Lys Ser Cys Gln Leu Gly
                630             635                 640

gaa tta cga aac ctg aat ctc tat ggc tca att gaa atc acg cat ctt      2439
Glu Leu Arg Asn Leu Asn Leu Tyr Gly Ser Ile Glu Ile Thr His Leu
                645             650                 655

gag aga gtg aag aat gat atg gat gca aaa gaa gcc aat tta tct gca      2487
Glu Arg Val Lys Asn Asp Met Asp Ala Lys Glu Ala Asn Leu Ser Ala
            660             665                 670

aaa gaa aat ctg cat tct tta agc atg aaa tgg gat gac gat gaa cgt      2535
Lys Glu Asn Leu His Ser Leu Ser Met Lys Trp Asp Asp Asp Glu Arg
        675             680                 685

cca cgt ata tat gaa tca gaa aaa gtt gaa gtg ctt gaa gct ctc aaa      2583
Pro Arg Ile Tyr Glu Ser Glu Lys Val Glu Val Leu Glu Ala Leu Lys
690             695                 700                 705

cca cac tcc aat ctg act tgt tta aca atc agg ggc ttc aga gga atc      2631
Pro His Ser Asn Leu Thr Cys Leu Thr Ile Arg Gly Phe Arg Gly Ile
                710             715                 720

cgt ctc cca gac tgg atg aat cac tca gtt ttg aaa aat gtt gtc tct      2679
Arg Leu Pro Asp Trp Met Asn His Ser Val Leu Lys Asn Val Val Ser
            725             730                 735

att gaa atc atc agt tgc aaa aac tgc tca tgc tta cca ccc ttt ggt      2727
Ile Glu Ile Ile Ser Cys Lys Asn Cys Ser Cys Leu Pro Pro Phe Gly
        740             745                 750

gag ctg cct tgt cta aaa agt cta gag tta tgg agg ggg tct gcg gaa      2775
Glu Leu Pro Cys Leu Lys Ser Leu Glu Leu Trp Arg Gly Ser Ala Glu
        755             760                 765

gtg gag tat gtt gat tct gga ttc cct aca aga aga agg ttt cca tct      2823
Val Glu Tyr Val Asp Ser Gly Phe Pro Thr Arg Arg Arg Phe Pro Ser
770             775                 780                 785

ctg aga aaa ctt aat ata cgc gaa ttt gat aat ctg aaa gga ttg ctg      2871
Leu Arg Lys Leu Asn Ile Arg Glu Phe Asp Asn Leu Lys Gly Leu Leu
                790             795                 800

aaa aag gaa gga gaa gag caa tgc cct gtg ctt gaa gag ata gag att      2919
Lys Lys Glu Gly Glu Glu Gln Cys Pro Val Leu Glu Glu Ile Glu Ile
                805             810                 815

aaa tgt tgc cct atg ttt gtt att cca acc ctt tct tct gtc aag aaa      2967
Lys Cys Cys Pro Met Phe Val Ile Pro Thr Leu Ser Ser Val Lys Lys
        820             825                 830

ttg gta gtt agt ggg gac aag tca gat gca ata ggt ttc agt tcc ata      3015
Leu Val Val Ser Gly Asp Lys Ser Asp Ala Ile Gly Phe Ser Ser Ile
835             840                 845

tct aat ctc atg gct ctt act tcc ctc caa att cgc tat aac aaa gaa      3063
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Ser Asn Leu Met Ala Leu Thr Ser Leu Gln Ile Arg Tyr Asn Lys Glu
850                 855             860                 865

gat gct tca ctc cca gaa gag atg ttc aaa agc ctt gca aat ctc aaa      3111
Asp Ala Ser Leu Pro Glu Glu Met Phe Lys Ser Leu Ala Asn Leu Lys
                870             875                 880

tac ttg aat atc tct ttt tac ttc aat ctt aaa gag ctg cct acc agc      3159
Tyr Leu Asn Ile Ser Phe Tyr Phe Asn Leu Lys Glu Leu Pro Thr Ser
            885             890                 895

ctg gct agt ctc aat gct ttg aag cat ctg gaa att cat agt tgt tat      3207
Leu Ala Ser Leu Asn Ala Leu Lys His Leu Glu Ile His Ser Cys Tyr
        900             905             910

gca cta gag agt ctc ccc gag gaa ggt gtg aaa ggt tta att tca ctc      3255
Ala Leu Glu Ser Leu Pro Glu Glu Gly Val Lys Gly Leu Ile Ser Leu
        915             920             925

aca cag tta tcc ata aca tac tgt gaa atg cta caa tgt tta ccg gag      3303
Thr Gln Leu Ser Ile Thr Tyr Cys Glu Met Leu Gln Cys Leu Pro Glu
930             935             940             945

gga ttg cag cac cta aca gcc ctc aca aat tta tca gtt gag ttt tgt      3351
Gly Leu Gln His Leu Thr Ala Leu Thr Asn Leu Ser Val Glu Phe Cys
            950             955             960

cca aca ctg gcc aag cgg tgt gag aag gga ata gga gaa gac tgg tac      3399
Pro Thr Leu Ala Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp Tyr
            965             970             975

aaa att gct cac att cct cgt gtg ttt att tat tagtattccc aattagatgt    3452
Lys Ile Ala His Ile Pro Arg Val Phe Ile Tyr
            980             985

aattttctga ttttcttttg gaaacaaatc aactatttgt aagatctatt tgtattatac   3512

ttgattttc ttgggtctgt aacaataaat atttgaaatt tttcatatta agattcagaa    3572

ttagtcttat agctaacggt atc                                            3595


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<213>  Solanum bulbocastanum

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Met Ala Glu Ala Phe Leu Gln Val Leu Leu Asp Asn Leu Thr Cys Phe
1               5               10              15

Ile Gln Gly Glu Leu Gly Leu Ile Leu Gly Phe Lys Asp Glu Phe Glu
            20              25              30

Lys Leu Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala
        35              40              45
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Gln Lys Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys
    50                  55                  60


Leu Asn Ala Ala Ala Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys
65                  70                  75                  80


Thr Glu Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His
              85                  90                  95
                                                                 \

Pro Asn Val Ile Thr Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys
             100                 105                 110


Ile Met Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His
        115                 120                 125


Leu Asp Glu Arg Thr Ile Glu Arg Gln Val Ala Thr Arg Gln Thr Gly
    130                 135                 140


Phe Val Leu Asn Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp
145                 150                 155                 160


Glu Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asn Ala Gln Thr Leu
             165                 170                 175


Pro Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu
             180                 185                 190


Ala Gln Met Val Phe Asn Asp Gln Arg Val Ile Glu His Phe His Pro
        195                 200                 205


Lys Ile Trp Ile Cys Val Ser Glu Asp Phe Asn Glu Lys Arg Leu Ile
    210                 215                 220


Lys Glu Ile Val Glu Ser Ile Glu Glu Lys Ser Leu Gly Gly Met Asp
225                 230                 235                 240


Leu Ala Pro Leu Gln Lys Lys Leu Arg Asp Leu Leu Asn Gly Lys Lys
             245                 250                 255


Tyr Leu Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Asp Lys Trp
        260                 265                 270


Ala Lys Leu Arg Gln Val Leu Lys Val Gly Ala Ser Gly Ala Ser Val
        275                 280                 285


Leu Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr Leu
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Gln Pro Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu Leu
305   310   315   320

Phe Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Leu Asn Leu
                325   330   335

Val Ala Ile Gly Lys Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu
                340   345   350

Ala Ala Lys Thr Leu Gly Gly Ile Leu Arg Phe Lys Arg Glu Glu Arg
                355   360   365

Gln Trp Glu His Val Arg Asp Ser Glu Ile Trp Lys Leu Pro Gln Glu
    370   375   380

Glu Ser Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His His Leu Pro
385   390   395   400

Leu Asp Leu Arg Gln Cys Phe Thr Tyr Cys Ala Val Phe Pro Lys Asp
                405   410   415

Thr Glu Met Glu Lys Gly Asn Leu Ile Ser Leu Trp Met Ala His Gly
                420   425   430

Phe Ile Leu Ser Lys Gly Asn Leu Glu Leu Glu Asn Val Gly Asn Glu
                435   440   445

Val Trp Asn Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val
    450   455   460

Lys Ser Gly Gln Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu
465   470   475   480

Ala Thr Ser Leu Phe Ser Ala Ser Thr Ser Ser Ser Asn Ile Arg Glu
                485   490   495

Ile Ile Val Glu Asn Tyr Ile His Met Met Ser Ile Gly Phe Thr Lys
                500   505   510

Val Val Ser Ser Tyr Ser Leu Ser His Leu Gln Lys Phe Val Ser Leu
                515   520   525

Arg Val Leu Asn Leu Ser Asp Ile Lys Leu Lys Gln Leu Pro Ser Ser
                530   535   540

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Ile Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Ser Gly Asn Thr
545                 550                 555                 560


Ser Ile Arg Ser Leu Pro Asn Gln Leu Cys Lys Leu Gln Asn Leu Gln
                565                 570                 575


Thr Leu Asp Leu His Gly Cys His Ser Leu Cys Cys Leu Pro Lys Glu
                580                 585                 590


Thr Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Cys Tyr
        595                 600                 605


Gly Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys
        610                 615                 620


Thr Leu Ser Arg Phe Val Val Gly Ile Gln Lys Lys Ser Cys Gln Leu
625                 630                 635                 640


Gly Glu Leu Arg Asn Leu Asn Leu Tyr Gly Ser Ile Glu Ile Thr His
                645                 650                 655


Leu Glu Arg Val Lys Asn Asp Met Asp Ala Lys Glu Ala Asn Leu Ser
            660                 665                 670


Ala Lys Glu Asn Leu His Ser Leu Ser Met Lys Trp Asp Asp Asp Glu
        675                 680                 685


Arg Pro Arg Ile Tyr Glu Ser Glu Lys Val Glu Val Leu Glu Ala Leu
    690                 695                 700


Lys Pro His Ser Asn Leu Thr Cys Leu Thr Ile Arg Gly Phe Arg Gly
705                 710                 715                 720


Ile Arg Leu Pro Asp Trp Met Asn His Ser Val Leu Lys Asn Val Val
            725                 730                 735


Ser Ile Glu Ile Ile Ser Cys Lys Asn Cys Ser Cys Leu Pro Pro Phe
            740                 745                 750


Gly Glu Leu Pro Cys Leu Lys Ser Leu Glu Leu Trp Arg Gly Ser Ala
        755                 760                 765


Glu Val Glu Tyr Val Asp Ser Gly Phe Pro Thr Arg Arg Arg Phe Pro
    770                 775                 780
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Ser Leu Arg Lys Leu Asn Ile Arg Glu Phe Asp Asn Leu Lys Gly Leu
785             790             795             800

Leu Lys Lys Glu Gly Glu Glu Gln Cys Pro Val Leu Glu Glu Ile Glu
            805             810             815

Ile Lys Cys Cys Pro Met Phe Val Ile Pro Thr Leu Ser Ser Val Lys
            820             825             830

Lys Leu Val Val Ser Gly Asp Lys Ser Asp Ala Ile Gly Phe Ser Ser
        835             840             845

Ile Ser Asn Leu Met Ala Leu Thr Ser Leu Gln Ile Arg Tyr Asn Lys
    850             855             860

Glu Asp Ala Ser Leu Pro Glu Glu Met Phe Lys Ser Leu Ala Asn Leu
865             870             875             880

Lys Tyr Leu Asn Ile Ser Phe Tyr Phe Asn Leu Lys Glu Leu Pro Thr
            885             890             895

Ser Leu Ala Ser Leu Asn Ala Leu Lys His Leu Glu Ile His Ser Cys
        900             905             910

Tyr Ala Leu Glu Ser Leu Pro Glu Glu Gly Val Lys Gly Leu Ile Ser
        915             920             925

Leu Thr Gln Leu Ser Ile Thr Tyr Cys Glu Met Leu Gln Cys Leu Pro
    930             935             940

Glu Gly Leu Gln His Leu Thr Ala Leu Thr Asn Leu Ser Val Glu Phe
945             950             955             960

Cys Pro Thr Leu Ala Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp
            965             970             975

Tyr Lys Ile Ala His Ile Pro Arg Val Phe Ile Tyr
            980             985
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                                                                       Met
                                                                      1

gct gaa gct ttc ctt caa gtt ctg tta gac aat ctg act tgt ttc atc   107
Ala Glu Ala Phe Leu Gln Val Leu Leu Asp Asn Leu Thr Cys Phe Ile
         5   10   15

caa ggg gaa gtt gga ttg att ctt ggt ttt aag gat gag ttc gaa aag   155
Gln Gly Glu Val Gly Leu Ile Leu Gly Phe Lys Asp Glu Phe Glu Lys
        20   25   30

ctt caa agc aca ttt act aca atc caa gct gtg cta gaa gat gct cag   203
Leu Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala Gln
        35   40   45

aag aag caa ttg aag gac aag gca ata gaa aat tgg ttg cag aaa ctc   251
Lys Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys Leu
50   55   60   65

aat gct gct gta tat gaa gct gac gac atc ttg gac gaa tgt aaa act   299
Asn Ala Ala Val Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys Thr
             70   75   80

gag gca cca att aga cag aag aag aac aaa tat ggg tgt tat cat cca   347
Glu Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His Pro
             85   90   95

aac gtt atc gct ttc cgt cac aag att ggg aaa agg atg aaa aag att   395
Asn Val Ile Ala Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys Ile
         100   105   110

atg gag aaa cta gat gta att gca gcg gaa cga att aag ttt cat ttg   443
Met Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His Leu
        115   120   125

gct gaa agg act aca gag aga caa gtt gct aca cgc caa aca ggt gct   491
Ala Glu Arg Thr Thr Glu Arg Gln Val Ala Thr Arg Gln Thr Gly Ala
130   135   140   145

cat ctt aga tat ttt tct aaaaaaacag ctttatatca tgaaattcat   539
His Leu Arg Tyr Phe Ser
           150

gtgtgtttgg gatttttttct aatctaaatg ttgtctcaag tctaagtaga taagtggatc   599

cagatttgga tatattaata tattatctaa atttgtttcg tgaaattttt aacagataaa   659

gcctgagttg ttttagacat tataaattaa caatgataat aatgtgaatt caaaaaagtg   719

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cattatgtct gctgcttctc aagcttatca ttgtctcttt attgtgcaaa attcttcttc      779

gttttttttg ctg act cct act gag ctt gga cca ggt ttt gtt tta aat gaa      830
            Leu Thr Pro Thr Glu Leu Gly Pro Gly Phe Val Leu Asn Glu
                         155                 160                 165

cca caa gtt tat gga aga gac aaa gaa aag gat gag ata gtg aaa atc      878
Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp Glu Ile Val Lys Ile
                170                 175                 180

ctg ata aac att gtt agc gat gcc caa aca ctt tca gtc ctc cca ata      926
Leu Ile Asn Ile Val Ser Asp Ala Gln Thr Leu Ser Val Leu Pro Ile
                185                 190                 195

ctt ggt atg ggg gga tta gga aag acg aca ctt gcc caa atg gtc ttc      974
Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala Gln Met Val Phe
            200                 205                 210

aat gat cag aga gta att gag cat ttc ctt ccc aaa ata tgg att tgt     1022
Asn Asp Gln Arg Val Ile Glu His Phe Leu Pro Lys Ile Trp Ile Cys
        215                 220                 225

gtc tcg gaa gat ttt aat gag aag agg ttg ata aag gaa att gta gaa     1070
Val Ser Glu Asp Phe Asn Glu Lys Arg Leu Ile Lys Glu Ile Val Glu
230                 235                 240                 245

tct att gaa gaa aag tca ctt ggt gac atg gac ttg gct cca ctt caa     1118
Ser Ile Glu Glu Lys Ser Leu Gly Asp Met Asp Leu Ala Pro Leu Gln
                250                 255                 260

aag aag ctt cag gac ttg ctg aat gga aaa aaa tat ttg ctt gtc tta     1166
Lys Lys Leu Gln Asp Leu Leu Asn Gly Lys Lys Tyr Leu Leu Val Leu
                265                 270                 275

gat gat att tgg aat gaa gat caa gat aag tgg gct aag tta cga gaa     1214
Asp Asp Ile Trp Asn Glu Asp Gln Asp Lys Trp Ala Lys Leu Arg Glu
            280                 285                 290

gtg ttg aag gtt gga gca agt ggt gct tct atc cta acc act act cgt     1262
Val Leu Lys Val Gly Ala Ser Gly Ala Ser Ile Leu Thr Thr Thr Arg
    295                 300                 305

ctt gaa aag gtt gga tca att atg caa act ttg caa cca tat gaa ttg     1310
Leu Glu Lys Val Gly Ser Ile Met Gln Thr Leu Gln Pro Tyr Glu Leu
310                 315                 320                 325

tca aac ttg tgt caa gaa gat tgc tgg ttg ttg ttc atg caa cgt gca     1358
Ser Asn Leu Cys Gln Glu Asp Cys Trp Leu Leu Phe Met Gln Arg Ala
                330                 335                 340

ttt ggg cac caa gaa gaa ata aat cat aat ctt gtg gct atc gga aag     1406
Phe Gly His Gln Glu Glu Ile Asn His Asn Leu Val Ala Ile Gly Lys
                345                 350                 355

gag ata gtg aaa aaa tgt ggt ggt gtg cct cta gca gct aaa act ctt     1454
Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu Ala Ala Lys Thr Leu
            360                 365                 370

gga ggt att ttg cga ttc aag aga caa gaa aga cag tgg gaa cat gtg     1502
Gly Gly Ile Leu Arg Phe Lys Arg Gln Glu Arg Gln Trp Glu His Val
    375                 380                 385
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aga gat agt gag att tgg aaa ttg cct caa gaa gaa agt tct att ctg        1550
Arg Asp Ser Glu Ile Trp Lys Leu Pro Gln Glu Glu Ser Ser Ile Leu
390                     395                 400                 405

ccg gcc ctg aaa ctt agt tac cat cat ctt cca ctt gat ttg aga caa        1598
Pro Ala Leu Lys Leu Ser Tyr His His Leu Pro Leu Asp Leu Arg Gln
                410                   .415              420

tgc ttt tca tat tgt gca gta ttc cca aag gat acc aaa atg gaa aag        1646
Cys Phe Ser Tyr Cys Ala Val Phe Pro Lys Asp Thr Lys Met Glu Lys
                425               430               435

gaa aat cta atc tct ctc tgg atg gca cat ggt ttt ctt tta tcg aaa        1694
Glu Asn Leu Ile Ser Leu Trp Met Ala His Gly Phe Leu Leu Ser Lys
        440               445               450

gga aac ttg gag cta gag gat gta ggt aat gaa gta tgg aat gaa tta        1742
Gly Asn Leu Glu Leu Glu Asp Val Gly Asn Glu Val Trp Asn Glu Leu
        455               460               465

tac ttg agg tct ttc ttc caa gag att gaa gtt aca tat ggt aaa act        1790
Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val Thr Tyr Gly Lys Thr
470                 475 .              480                 485

tat ttc aag atg cat gat ctc atc cat gat ttg gct aca tct cta ttt        1838
Tyr Phe Lys Met His Asp Leu Ile His Asp Leu Ala Thr Ser Leu Phe
                490               495               500

tcg gca agc gca tca agc aac aat atc cgt gaa ata aat gta aaa ggt        1886
Ser Ala Ser Ala Ser Ser Asn Asn Ile Arg Glu Ile Asn Val Lys Gly
                505               510               515

tac cca cat atg atg tcg att ggc ttt gca aaa gtg gtg tct ttt tac        1934
Tyr Pro His Met Met Ser Ile Gly Phe Ala Lys Val Val Ser Phe Tyr
                520               525               530

tct cgt tct cac ttc caa aag ttt gtc tcg tta agg gtg ctt aat cta        1982
Ser Arg Ser His Phe Gln Lys Phe Val Ser Leu Arg Val Leu Asn Leu
        535               540               545

agt aac tta gaa ctc aag cag tta cca tct tca att ggg gat cta gta        2030
Ser Asn Leu Glu Leu Lys Gln Leu Pro Ser Ser Ile Gly Asp Leu Val
550                 555               560                 565

cat tta aga tac cta aac ttg tct gac aat aat aga att cgt agt ctt        2078
His Leu Arg Tyr Leu Asn Leu Ser Asp Asn Asn Arg Ile Arg Ser Leu
                570               575               580

ccc aag cag tta tgc aag ctt caa aat ctg cag act ctt gat cta cgt        2126
Pro Lys Gln Leu Cys Lys Leu Gln Asn Leu Gln Thr Leu Asp Leu Arg
                585               590               595

tgt tgc tac aga ctt tct tgt ttg cca aaa gaa aca agc aaa ctt ggt        2174
Cys Cys Tyr Arg Leu Ser Cys Leu Pro Lys Glu Thr Ser Lys Leu Gly
                600               605               610

agt ctc cga aat ctt tta ctt gat cgt tgc cat gga ttg act tgt atg        2222
Ser Leu Arg Asn Leu Leu Leu Asp Arg Cys His Gly Leu Thr Cys Met
        615               620     .         625
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cca cca agg ata gga tca ttg aca tgc ctt aag act cta gat cgc ttt      2270
Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys Thr Leu Asp Arg Phe
630             635             640                 645

gca atg gga agg gag aaa agt cct caa att ggt gaa tta cga aac ctg      2318
Ala Met Gly Arg Glu Lys Ser Pro Gln Ile Gly Glu Leu Arg Asn Leu
                650             655                 660

aat ctc tat ggc tca att tca atc acg cat ctt gag aga gtg aag aat      2366
Asn Leu Tyr Gly Ser Ile Ser Ile Thr His Leu Glu Arg Val Lys Asn
            665             670                 675

gat atg gat gca aaa gaa gcc aat tta tct tca aaa gaa aat ctg cat      2414
Asp Met Asp Ala Lys Glu Ala Asn Leu Ser Ser Lys Glu Asn Leu His
            680             685                 690

tct tta agt atg ata tgg gat gaa gat gaa cgt cca cat aga tat gaa      2462
Ser Leu Ser Met Ile Trp Asp Glu Asp Glu Arg Pro His Arg Tyr Glu
            695             700                 705

tca gaa gat gtt gaa gtg ctt gaa gcc ctc aaa cca cac tcc aat ctg      2510
Ser Glu Asp Val Glu Val Leu Glu Ala Leu Lys Pro His Ser Asn Leu
710             715             720                 725

act tgt tta aca att att ggc ttc aga gga atc cgt ctc cca gac tgg      2558
Thr Cys Leu Thr Ile Ile Gly Phe Arg Gly Ile Arg Leu Pro Asp Trp
            730             735                 740

atg aat cac tca gtt ttg aaa aat gtt gtc tct ctt gaa atc agc gat      2606
Met Asn His Ser Val Leu Lys Asn Val Val Ser Leu Glu Ile Ser Asp
            745             750                 755

tgc aaa aac tgc tca tgc tta cca ccc ttt ggt gaa ctg cct tgt cta      2654
Cys Lys Asn Cys Ser Cys Leu Pro Pro Phe Gly Glu Leu Pro Cys Leu
            760             765                 770

aat agt cta cag tta tgg agt ggg tct gca gaa gtg gag tat att gat      2702
Asn Ser Leu Gln Leu Trp Ser Gly Ser Ala Glu Val Glu Tyr Ile Asp
            775             780                 785

tct gga ttc cct aca aga aga agg ttt cca tct ctg aga aaa ctt att      2750
Ser Gly Phe Pro Thr Arg Arg Arg Phe Pro Ser Leu Arg Lys Leu Ile
790             795             800                 805

ata ggc gaa ttt gat aat ctg aaa gga ttg gtg aaa aag gaa gga gaa      2798
Ile Gly Glu Phe Asp Asn Leu Lys Gly Leu Val Lys Lys Glu Gly Glu
            810             815                 820

gag caa ttc cct gtg ctt gaa gag atg gag att aac tgg tgc cct atg      2846
Glu Gln Phe Pro Val Leu Glu Glu Met Glu Ile Asn Trp Cys Pro Met
            825             830                 835

ttt gtt att ccg acc ctt tct tct gtc aac aaa ttg gta gtt agt ggg      2894
Phe Val Ile Pro Thr Leu Ser Ser Val Asn Lys Leu Val Val Ser Gly
            840             845                 850

gaa gag tca gat gca ata ggc ttc agt tcc ata tct aat ctc agg gct      2942
Glu Glu Ser Asp Ala Ile Gly Phe Ser Ser Ile Ser Asn Leu Arg Ala
855             860             865

ctt act tct ctc aat att agc tat aac tct gaa gct act tca ctc cca      2990
Leu Thr Ser Leu Asn Ile Ser Tyr Asn Ser Glu Ala Thr Ser Leu Pro
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Leu Thr Ser Leu Asn Ile Ser Tyr Asn Ser Glu Ala Thr Ser Leu Pro
870                 875             880                 885

gaa gag atg ttc aaa agc ctt gca aat cta aaa tac ttg aat atc tat       3038
Glu Glu Met Phe Lys Ser Leu Ala Asn Leu Lys Tyr Leu Asn Ile Tyr
            890                 895                 900

tac ttc aag aat ctc aaa gag ctg cct acc aac ctg gct agt ctt aat       3086
Tyr Phe Lys Asn Leu Lys Glu Leu Pro Thr Asn Leu Ala Ser Leu Asn
            905                 910                 915

gct ttg aag aat ctg gaa att gaa agt tgt tat gca cta gag agt ctc       3134
Ala Leu Lys Asn Leu Glu Ile Glu Ser Cys Tyr Ala Leu Glu Ser Leu
            920                 925                 930

ccc gag gaa ggt gtg aaa ggt tta act tca ctt aca caa tta tcc ata       3182
Pro Glu Glu Gly Val Lys Gly Leu Thr Ser Leu Thr Gln Leu Ser Ile
            935                 940                 945

aca tac tgc acg atg cta caa tgt tta tcg gag gga ttg cag cac cta       3230
Thr Tyr Cys Thr Met Leu Gln Cys Leu Ser Glu Gly Leu Gln His Leu
950                 955                 960                 965

aca gcc ctc aca aat tta tca gtt agg gat tgt cca aca ctg gcc aag       3278
Thr Ala Leu Thr Asn Leu Ser Val Arg Asp Cys Pro Thr Leu Ala Lys
            970                 975                 980

cga tgt gag aag gga ata gga gaa gac tgg tac aaa att gct cac att       3326
Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp Tyr Lys Ile Ala His Ile
            985                 990                 995

cct gat gtg  ttt atc cgt taa                                          3347
Pro Asp Val  Phe Ile Arg
            1000


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Met Ala Glu Ala Phe Leu Gln Val Leu Leu Asp Asn Leu Thr Cys Phe
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Ile Gln Gly Glu Val Gly Leu Ile Leu Gly Phe Lys Asp Glu Phe Glu
            20              25                  30


Lys Leu Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala
        35              40                  45


Gln Lys Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys
    50              55                  60


Leu Asn Ala Ala Val Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys
65              70                  75                  80
```

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Thr Glu Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His
            85                  90                  95


Pro Asn Val Ile Ala Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys
            100                 105                 110


Ile Met Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His
            115                 120                 125


Leu Ala Glu Arg Thr Thr Glu Arg Gln Val Ala Thr Arg Gln Thr Gly
    130                 135                 140


Ala His Leu Arg Tyr Phe Ser Leu Thr Pro Thr Glu Leu Gly Pro Gly
145                 150                 155                 160


Phe Val Leu Asn Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp
            165                 170                 175


Glu Ile Val Lys Ile Leu Ile Asn Ile Val Ser Asp Ala Gln Thr Leu
            180                 185                 190


Ser Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu
    195                 200                 205


Ala Gln Met Val Phe Asn Asp Gln Arg Val Ile Glu His Phe Leu Pro
    210                 215                 220


Lys Ile Trp Ile Cys Val Ser Glu Asp Phe Asn Glu Lys Arg Leu Ile
225                 230                 235                 240


Lys Glu Ile Val Glu Ser Ile Glu Glu Lys Ser Leu Gly Asp Met Asp
            245                 250                 255


Leu Ala Pro Leu Gln Lys Lys Leu Gln Asp Leu Leu Asn Gly Lys Lys
            260                 265                 270


Tyr Leu Leu Val Leu Asp Asp Ile Trp Asn Glu Asp Gln Asp Lys Trp
    275                 280                 285


Ala Lys Leu Arg Glu Val Leu Lys Val Gly Ala Ser Gly Ala Ser Ile
    290                 295                 300


Leu Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gln Thr Leu
305                 310                 315                 320
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Gln Pro Tyr Glu Leu Ser Asn Leu Cys Gln Glu Asp Cys Trp Leu Leu
             325                 330             335

Phe Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn His Asn Leu
             340                 345             350

Val Ala Ile Gly Lys Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu
             355                 360             365

Ala Ala Lys Thr Leu Gly Gly Ile Leu Arg Phe Lys Arg Gln Glu Arg
     370             375             380

Gln Trp Glu His Val Arg Asp Ser Glu Ile Trp Lys Leu Pro Gln Glu
385             390             395                         400

Glu Ser Ser Ile Leu Pro Ala Leu Lys Leu Ser Tyr His His Leu Pro
             405                 410                 415

Leu Asp Leu Arg Gln Cys Phe Ser Tyr Cys Ala Val Phe Pro Lys Asp
             420             425                 430

Thr Lys Met Glu Lys Glu Asn Leu Ile Ser Leu Trp Met Ala His Gly
         435             440                 445

Phe Leu Leu Ser Lys Gly Asn Leu Glu Leu Glu Asp Val Gly Asn Glu
     450             455                 460

Val Trp Asn Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val
465             470                 475                     480

Thr Tyr Gly Lys Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu
             485             490                 495

Ala Thr Ser Leu Phe Ser Ala Ser Ser Ser Asn Asn Ile Arg Glu
         500             505                 510

Ile Asn Val Lys Gly Tyr Pro His Met Met Ser Ile Gly Phe Ala Lys
         515             520                 525

Val Val Ser Phe Tyr Ser Arg Ser His Phe Gln Lys Phe Val Ser Leu
     530             535                 540

Arg Val Leu Asn Leu Ser Asn Leu Glu Leu Lys Gln Leu Pro Ser Ser
545             550                 555                     560
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Ile Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Ser Asp Asn Asn
                565   570   575

Arg Ile Arg Ser Leu Pro Lys Gln Leu Cys Lys Leu Gln Asn Leu Gln
                580   585   590

Thr Leu Asp Leu Arg Cys Cys Tyr Arg Leu Ser Cys Leu Pro Lys Glu
                595   600   605

Thr Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Arg Cys His
        610   615   620

Gly Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys
625   630   635   640

Thr Leu Asp Arg Phe Ala Met Gly Arg Glu Lys Ser Pro Gln Ile Gly
                645   650   655

Glu Leu Arg Asn Leu Asn Leu Tyr Gly Ser Ile Ser Ile Thr His Leu
            660   665   670

Glu Arg Val Lys Asn Asp Met Asp Ala Lys Glu Ala Asn Leu Ser Ser
        675   680   685

Lys Glu Asn Leu His Ser Leu Ser Met Ile Trp Asp Glu Asp Glu Arg
        690   695   700

Pro His Arg Tyr Glu Ser Glu Asp Val Glu Val Leu Glu Ala Leu Lys
705   710   715   720

Pro His Ser Asn Leu Thr Cys Leu Thr Ile Ile Gly Phe Arg Gly Ile
                725   730   735

Arg Leu Pro Asp Trp Met Asn His Ser Val Leu Lys Asn Val Val Ser
            740   745   750

Leu Glu Ile Ser Asp Cys Lys Asn Cys Ser Cys Leu Pro Pro Phe Gly
        755   760   765

Glu Leu Pro Cys Leu Asn Ser Leu Gln Leu Trp Ser Gly Ser Ala Glu
    770   775   780

Val Glu Tyr Ile Asp Ser Gly Phe Pro Thr Arg Arg Arg Phe Pro Ser
785   790   795   800

Leu Arg Lys Leu Ile Ile Gly Glu Phe Asp Asn Leu Lys Gly Leu Val

Lys Lys Glu Gly Glu Glu Gln Phe Pro Val Leu Glu Glu Met Glu Ile
            820   825   830

Asn Trp Cys Pro Met Phe Val Ile Pro Thr Leu Ser Ser Val Asn Lys
            835   840   845

Leu Val Val Ser Gly Glu Glu Ser Asp Ala Ile Gly Phe Ser Ser Ile
        850   855   860

Ser Asn Leu Arg Ala Leu Thr Ser Leu Asn Ile Ser Tyr Asn Ser Glu
865   870   875   880

Ala Thr Ser Leu Pro Glu Glu Met Phe Lys Ser Leu Ala Asn Leu Lys
                885   890   895

Tyr Leu Asn Ile Tyr Tyr Phe Lys Asn Leu Lys Glu Leu Pro Thr Asn
            900   905   910

Leu Ala Ser Leu Asn Ala Leu Lys Asn Leu Glu Ile Glu Ser Cys Tyr
            915   920   925

Ala Leu Glu Ser Leu Pro Glu Glu Gly Val Lys Gly Leu Thr Ser Leu
    930   935   940

Thr Gln Leu Ser Ile Thr Tyr Cys Thr Met Leu Gln Cys Leu Ser Glu
945   950   955   960

Gly Leu Gln His Leu Thr Ala Leu Thr Asn Leu Ser Val Arg Asp Cys
                965   970   975

Pro Thr Leu Ala Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp Tyr
            980   985   990

Lys Ile Ala His Ile Pro Asp Val Phe Ile Arg
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atg gct gaa gct ttc ctt caa gtt ctg cta ggc aat atc act tct ttc   105
Met Ala Glu Ala Phe Leu Gln Val Leu Leu Gly Asn Ile Thr Ser Phe
1   5   10   15

atc caa ggg gaa ctt gta ttg ctt ttc ggt ttt gaa aac gac ttc aga   153
Ile Gln Gly Glu Leu Val Leu Leu Phe Gly Phe Glu Asn Asp Phe Arg
                20   25   30

aag ctt tca agc aca ttt tct acg atc caa ctt gtg ctt gaa gat gct   201
Lys Leu Ser Ser Thr Phe Ser Thr Ile Gln Leu Val Leu Glu Asp Ala
            35   40   45

tca gag aag caa ctg aag gac aag gca ata gag aat tgg ttg cag aaa   249
Ser Glu Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys
        50   55   60

ctc aat ttt gct gca tat gaa gtc gat gac atc ttg gat gaa tgt aaa   297
Leu Asn Phe Ala Ala Tyr Glu Val Asp Asp Ile Leu Asp Glu Cys Lys
65   70   75   80

aat gag gca gca aga ttc aat cag tcc tta tta ggg tat att cat cca   345
Asn Glu Ala Ala Arg Phe Asn Gln Ser Leu Leu Gly Tyr Ile His Pro
                85   90   95

aag atc atc att ttt cgt tac aag ctc gga aaa aga atg aaa aga atg   393
Lys Ile Ile Ile Phe Arg Tyr Lys Leu Gly Lys Arg Met Lys Arg Met
                100   105   110

atg gag aaa cta gat gca att gct gac gaa aga agg aag ttt cat ttg   441
Met Glu Lys Leu Asp Ala Ile Ala Asp Glu Arg Arg Lys Phe His Leu
            115   120   125

cgt gca aag att gtc gag aaa caa gct tct aaa cgt gaa aca ggt gct   489
Arg Ala Lys Ile Val Glu Lys Gln Ala Ser Lys Arg Glu Thr Gly Ala
        130   135   140

cat ctt aaa ctg tgt tta gcc aag tac tta cta ata gct tagtttata   538
His Leu Lys Leu Cys Leu Ala Lys Tyr Leu Leu Ile Ala
145   150   155

ttcatctttt tgtagttacc agattctata catgtttgtt ccatgtcagc ccttccttgt   598

gtcttttgt tttgcaaaaa tcttctatta ttcctgctga ctcctttag tgagcttgaa   658

tttaataaaa tttgtgttcg cattgcttgt ga aca ggt ttt gtt tta gca gag   711
                                    Thr Gly Phe Val Leu Ala Glu
                                        160

cca aaa gtt tat gga agg gac aaa gag aag gat gag atg gtg aaa atc   759
Pro Lys Val Tyr Gly Arg Asp Lys Glu Lys Asp Glu Met Val Lys Ile

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      165                   170                   175                   180
ttg ata aac agt gtt agt aat gcc caa gaa cta tta gtg ctc cca ata        807
Leu Ile Asn Ser Val Ser Asn Ala Gln Glu Leu Leu Val Leu Pro Ile
                185                   190                   195

ctt ggt atg ggg gga cta gga aag aca aca ctt gcc caa atg att ttt        855
Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala Gln Met Ile Phe
                200                   205                   210

aat gat cag agc gtg act gca cat ttc aat cta aag ata tgg gtt tgt        903
Asn Asp Gln Ser Val Thr Ala His Phe Asn Leu Lys Ile Trp Val Cys
                215                   220                   225

gtc tca gat gat ttt gat gag aag agg ttg ata aag gca att gta gaa        951
Val Ser Asp Asp Phe Asp Glu Lys Arg Leu Ile Lys Ala Ile Val Glu
        230                   235                   240

tct att gaa aga agg cca ctt ggt gac ata gac ttg gct ccc ctc cag        999
Ser Ile Glu Arg Arg Pro Leu Gly Asp Ile Asp Leu Ala Pro Leu Gln
245                   250                   255                   260

aag aag ctt cag gag ttg ttg aat gga aaa aga tac ttt ctt gtt tta       1047
Lys Lys Leu Gln Glu Leu Leu Asn Gly Lys Arg Tyr Phe Leu Val Leu
                265                   270                   275

gat gat gtt tgg aat gaa gat caa gaa aag tgg gct aag ata aaa gca       1095
Asp Asp Val Trp Asn Glu Asp Gln Glu Lys Trp Ala Lys Ile Lys Ala
                280                   285                   290

gtc tta aag gtt gga gca caa ggt tct tct att cta gcc act act cgt       1143
Val Leu Lys Val Gly Ala Gln Gly Ser Ser Ile Leu Ala Thr Thr Arg
        295                   300                   305

ctt gaa agg gtc gga tca att atg gga act tgg caa cca tat cag tta       1191
Leu Glu Arg Val Gly Ser Ile Met Gly Thr Trp Gln Pro Tyr Gln Leu
        310                   315                   320

tca att ttg tct cca gaa tat tgt tgg ttg ttg ttc aag caa cgt gca       1239
Ser Ile Leu Ser Pro Glu Tyr Cys Trp Leu Leu Phe Lys Gln Arg Ala
325                   330                   335                   340

ttt ggc cac caa acg gaa aca aat cct gcc ctt gtg ggg att gga aaa       1287
Phe Gly His Gln Thr Glu Thr Asn Pro Ala Leu Val Gly Ile Gly Lys
                345                   350                   355

gag att gtg aag aaa tgt ggg ggt gtg cct cta gca gcc aag act ctt       1335
Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu Ala Ala Lys Thr Leu
                360                   365                   370

gga ggt ctt tta cgc ttc aag aga gaa gaa agt gaa tgg gaa cat gtg       1383
Gly Gly Leu Leu Arg Phe Lys Arg Glu Glu Ser Glu Trp Glu His Val
                375                   380                   385

aaa gat agt gag att tgg aat tta cct caa gat gaa aat tct gtt ttg       1431
Lys Asp Ser Glu Ile Trp Asn Leu Pro Gln Asp Glu Asn Ser Val Leu
        390                   395                   400

cct tcc ctg agg ctg agt tat cat cac ctt cca ctt aat ttg aga caa       1479
Pro Ser Leu Arg Leu Ser Tyr His His Leu Pro Leu Asn Leu Arg Gln
405                   410                   415                   420
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tgt ttt gca tat tgt gcg gta ttc cca aag gac acc aaa ata gaa aag        1527
Cys Phe Ala Tyr Cys Ala Val Phe Pro Lys Asp Thr Lys Ile Glu Lys
                425                 430                 435

gaa tat ctc atc act ctc tgg atg gca cat ggt ttt ctt tta tca aaa        1575
Glu Tyr Leu Ile Thr Leu Trp Met Ala His Gly Phe Leu Leu Ser Lys
                440                 445                 450

gaa aat tca gag cta gag gat gtg ggt aat gaa gta tgg aaa gaa tta        1623
Glu Asn Ser Glu Leu Glu Asp Val Gly Asn Glu Val Trp Lys Glu Leu
                455                 460                 465

tac ttg agg tct ttc ttc caa gag gtc gaa gaa tat aaa ttt ggt aat        1671
Tyr Leu Arg Ser Phe Phe Gln Glu Val Glu Glu Tyr Lys Phe Gly Asn
            470                 475                 480

act tat ttc aag atg cat gat ctc atc cac gat ttg gct aca tct ctg        1719
Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu Ala Thr Ser Leu
485                 490                 495                 500

ttc tca aca aac aca agg agc agc aaa att cgt caa ata aga gta gca        1767
Phe Ser Thr Asn Thr Arg Ser Ser Lys Ile Arg Gln Ile Arg Val Ala
                505                 510                 515

cag aaa aat aca att cct att ggt ttt gct gaa gtg gtg cct tct tat        1815
Gln Lys Asn Thr Ile Pro Ile Gly Phe Ala Glu Val Val Pro Ser Tyr
                520                 525                 530

tct cct tta atc ttt aaa agg ttt gtc tcg cta agg gtt ctt gat atg        1863
Ser Pro Leu Ile Phe Lys Arg Phe Val Ser Leu Arg Val Leu Asp Met
            535                 540                 545

aaa ttt tca aag ttt gat cag tta tca tct tcc atc gga gat cta ata        1911
Lys Phe Ser Lys Phe Asp Gln Leu Ser Ser Ser Ile Gly Asp Leu Ile
        550                 555                 560

cat tta agg ttg ttg aac ttg cgt ggc agt agc att cgt agc ctt cca        1959
His Leu Arg Leu Leu Asn Leu Arg Gly Ser Ser Ile Arg Ser Leu Pro
565                 570                 575                 580

aag agg tta tgc aag ctt caa aat ctg cag aca ctt gat ata tca tgt        2007
Lys Arg Leu Cys Lys Leu Gln Asn Leu Gln Thr Leu Asp Ile Ser Cys
                585                 590                 595

tgt ttc tca ctt tct tat att cca aaa caa ata agt aaa tta agt agt        2055
Cys Phe Ser Leu Ser Tyr Ile Pro Lys Gln Ile Ser Lys Leu Ser Ser
            600                 605                 610

ctt aga aat ctt gtg ttc agt ggt tgt caa ata act tct atg cca cca        2103
Leu Arg Asn Leu Val Phe Ser Gly Cys Gln Ile Thr Ser Met Pro Pro
            615                 620                 625

aga ata gga tca ttg aca tgc ctt aag act cta gat tac ttt att gtc        2151
Arg Ile Gly Ser Leu Thr Cys Leu Lys Thr Leu Asp Tyr Phe Ile Val
        630                 635                 640

ggc gag agg aaa ggt tat caa ctt ggt gaa cta cgg aat cta agc cta        2199
Gly Glu Arg Lys Gly Tyr Gln Leu Gly Glu Leu Arg Asn Leu Ser Leu
645                 650                 655                 660
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cat ggt tca ctt tca atc tca cat ctt gag aga gtg aag agt gaa acg          2247
His Gly Ser Leu Ser Ile Ser His Leu Glu Arg Val Lys Ser Glu Thr
                665                 670                 675

gat gca aaa gaa gct aat tta tct acc aaa caa aaa ttg tac aat tta          2295
Asp Ala Lys Glu Ala Asn Leu Ser Thr Lys Gln Lys Leu Tyr Asn Leu
            680                 685                 690

tgc atg agt tgg gat att agg cca tat gga tat gaa tca gaa aac aat          2343
Cys Met Ser Trp Asp Ile Arg Pro Tyr Gly Tyr Glu Ser Glu Asn Asn
            695                 700                 705

ttg gat gaa aaa gtg ctt gaa gcc ctc aga cca cac tcc aac ctg aaa          2391
Leu Asp Glu Lys Val Leu Glu Ala Leu Arg Pro His Ser Asn Leu Lys
            710                 715                 720

tca cta aag ctc att ggc ttc aga ggt ttt cat ttt cca aat tgg atg          2439
Ser Leu Lys Leu Ile Gly Phe Arg Gly Phe His Phe Pro Asn Trp Met
725                 730                 735                 740

aac gct tcg gtt ttg aaa aat gtc gtc tct att gaa att gaa tgt gaa          2487
Asn Ala Ser Val Leu Lys Asn Val Val Ser Ile Glu Ile Glu Cys Glu
                745                 750                 755

aac tgc tgg cgt tta cca cca ttt gga gag ctg cct tgt cta gaa agt          2535
Asn Cys Trp Arg Leu Pro Pro Phe Gly Glu Leu Pro Cys Leu Glu Ser
            760                 765                 770

cta aag tta tac aac gga tct gcg gag gtg gag tat att gaa gag gat          2583
Leu Lys Leu Tyr Asn Gly Ser Ala Glu Val Glu Tyr Ile Glu Glu Asp
            775                 780                 785

gat ggt cat tcc aca tta aag ttc cca tac ttg aaa cga ctt gct att          2631
Asp Gly His Ser Thr Leu Lys Phe Pro Tyr Leu Lys Arg Leu Ala Ile
            790                 795                 800

gaa aga ttt cca aat ctg aaa gga ctg ctg aga agt gaa gga gaa gag          2679
Glu Arg Phe Pro Asn Leu Lys Gly Leu Leu Arg Ser Glu Gly Glu Glu
805                 810                 815                 820

aaa ttc tcc atg ctt gaa gaa atg gaa att tgg cat tgc cct atg ttt          2727
Lys Phe Ser Met Leu Glu Glu Met Glu Ile Trp His Cys Pro Met Phe
                825                 830                 835

gtt ttt cca gca ttc tct tct gtc acg aaa ttg gat gtc tgg ggg gaa          2775
Val Phe Pro Ala Phe Ser Ser Val Thr Lys Leu Asp Val Trp Gly Glu
            840                 845                 850

ata gat gca gca agt ctt agc tcc ata tct aag ctt acc act ctt acg          2823
Ile Asp Ala Ala Ser Leu Ser Ser Ile Ser Lys Leu Thr Thr Leu Thr
            855                 860                 865

tct ctc tct att gat cat aac ttt gaa gca aca act ctc cca gaa gag          2871
Ser Leu Ser Ile Asp His Asn Phe Glu Ala Thr Thr Leu Pro Glu Glu
            870                 875                 880

atg ttc aaa cgc ctt gta aat ctt gag tcc ttg agc att ata tac ttc          2919
Met Phe Lys Arg Leu Val Asn Leu Glu Ser Leu Ser Ile Ile Tyr Phe
885                 890                 895                 900

aaa aaa ctc aga gag ttg cca agc agc ctg gct agc ctc aat gct ttg          2967
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Lys Lys Leu Arg Glu Leu Pro Ser Ser Leu Ala Ser Leu Asn Ala Leu
                905                   · 910              915

aag tgt cta aaa att cat tat tgt tac gca cta gag agt ctc ccc gaa         3015
Lys Cys Leu Lys Ile His Tyr Cys Tyr Ala Leu Glu Ser Leu Pro Glu
                920               925              930

caa ggg atg gaa ggg tta act tca ctc acc gac tta tat gtt caa aac         3063
Gln Gly Met Glu Gly Leu Thr Ser Leu Thr Asp Leu Tyr Val Gln Asn
                935              940              945

tgt gag atg cta aaa tgt tta cct gag gga ttg cag cac cta aga gcc         3111
Cys Glu Met Leu Lys Cys Leu Pro Glu Gly Leu Gln His Leu Arg Ala
        950              955              960

ctc act agt tta caa att tat ggc tgt cca gca ttg aaa aag cgg tgt         3159
Leu Thr Ser Leu Gln Ile Tyr Gly Cys Pro Ala Leu Lys Lys Arg Cys
965              970              975              980

gcg aag ggg ata gga gag gac tgg cac aaa att gct cac att cct aat         3207
Ala Lys Gly Ile Gly Glu Asp Trp His Lys Ile Ala His Ile Pro Asn
                985              990              995

gta gat att tgt   tag                                                    3222
Val Asp Ile Cys   tag
                1000


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Ile Gln Gly Glu Leu Val Leu Leu Phe Gly Phe Glu Asn Asp Phe Arg
                20                  25              ·   30


Lys Leu Ser Ser Thr Phe Ser Thr Ile Gln Leu Val Leu Glu Asp Ala
            35                  40                  45


Ser Glu Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys
        50                  55                  60


Leu Asn Phe Ala Ala Tyr Glu Val Asp Asp Ile Leu Asp Glu Cys Lys
65                  70                  75                  80


Asn Glu Ala Ala Arg Phe Asn Gln Ser Leu Leu Gly Tyr Ile His Pro
                85                  90                  95


Lys Ile Ile Ile Phe Arg Tyr Lys Leu Gly Lys Arg Met Lys Arg Met
            100                 105                 110
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Met Glu Lys Leu Asp Ala Ile Ala Asp Glu Arg Arg Lys Phe His Leu
        115                 120                 125

Arg Ala Lys Ile Val Glu Lys Gln Ala Ser Lys Arg Glu Thr Gly Ala
        130                 135                 140

His Leu Lys Leu Cys Leu Ala Lys Tyr Leu Leu Ile Ala Thr Gly Phe
145                 150                 155                 160

Val Leu Ala Glu Pro Lys Val Tyr Gly Arg Asp Lys Glu Lys Asp Glu
                165                 170                 175

Met Val Lys Ile Leu Ile Asn Ser Val Ser Asn Ala Gln Glu Leu Leu
            180                 185                 190

Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala
            195                 200                 205

Gln Met Ile Phe Asn Asp Gln Ser Val Thr Ala His Phe Asn Leu Lys
    210                 215                 220

Ile Trp Val Cys Val Ser Asp Asp Phe Asp Glu Lys Arg Leu Ile Lys
225                 230                 235                 240

Ala Ile Val Glu Ser Ile Glu Arg Arg Pro Leu Gly Asp Ile Asp Leu
                245                 250                 255

Ala Pro Leu Gln Lys Lys Leu Gln Glu Leu Leu Asn Gly Lys Arg Tyr
                260                 265                 270

Phe Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Glu Lys Trp Ala
            275                 280                 285

Lys Ile Lys Ala Val Leu Lys Val Gly Ala Gln Gly Ser Ser Ile Leu
    290                 295                 300

Ala Thr Thr Arg Leu Glu Arg Val Gly Ser Ile Met Gly Thr Trp Gln
305                 310                 315                 320

Pro Tyr Gln Leu Ser Ile Leu Ser Pro Glu Tyr Cys Trp Leu Leu Phe
                325                 330                 335

Lys Gln Arg Ala Phe Gly His Gln Thr Glu Thr Asn Pro Ala Leu Val
            340                 345                 350
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Gly Ile Gly Lys Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu Ala
    355                 360                 365

Ala Lys Thr Leu Gly Gly Leu Leu Arg Phe Lys Arg Glu Glu Ser Glu
    370                 375                 380

Trp Glu His Val Lys Asp Ser Glu Ile Trp Asn Leu Pro Gln Asp Glu
385                 390                 395                 400

Asn Ser Val Leu Pro Ser Leu Arg Leu Ser Tyr His His Leu Pro Leu
                405                 410                 415

Asn Leu Arg Gln Cys Phe Ala Tyr Cys Ala Val Phe Pro Lys Asp Thr
                420                 425                 430

Lys Ile Glu Lys Glu Tyr Leu Ile Thr Leu Trp Met Ala His Gly Phe
    435                 440                 445

Leu Leu Ser Lys Glu Asn Ser Glu Leu Glu Asp Val Gly Asn Glu Val
    450                 455                 460

Trp Lys Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Val Glu Glu Tyr
465                 470                 475                 480

Lys Phe Gly Asn Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu
                485                 490                 495

Ala Thr Ser Leu Phe Ser Thr Asn Thr Arg Ser Ser Lys Ile Arg Gln
                500                 505                 510

Ile Arg Val Ala Gln Lys Asn Thr Ile Pro Ile Gly Phe Ala Glu Val
    515                 520                 525

Val Pro Ser Tyr Ser Pro Leu Ile Phe Lys Arg Phe Val Ser Leu Arg
    530                 535                 540

Val Leu Asp Met Lys Phe Ser Lys Phe Asp Gln Leu Ser Ser Ser Ile
545                 550                 555                 560

Gly Asp Leu Ile His Leu Arg Leu Leu Asn Leu Arg Gly Ser Ser Ile
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Arg Ser Leu Pro Lys Arg Leu Cys Lys Leu Gln Asn Leu Gln Thr Leu
                580                 585                 590
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Asp Ile Ser Cys Cys Phe Ser Leu Ser Tyr Ile Pro Lys Gln Ile Ser
    595   600   605

Lys Leu Ser Ser Leu Arg Asn Leu Val Phe Ser Gly Cys Gln Ile Thr
    610   615   620

Ser Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys Thr Leu Asp
625   630   635   640

Tyr Phe Ile Val Gly Glu Arg Lys Gly Tyr Gln Leu Gly Glu Leu Arg
                645   650   655

Asn Leu Ser Leu His Gly Ser Leu Ser Ile Ser His Leu Glu Arg Val
                660   665   670

Lys Ser Glu Thr Asp Ala Lys Glu Ala Asn Leu Ser Thr Lys Gln Lys
        675   680   685

Leu Tyr Asn Leu Cys Met Ser Trp Asp Ile Arg Pro Tyr Gly Tyr Glu
    690   695   700

Ser Glu Asn Asn Leu Asp Glu Lys Val Leu Glu Ala Leu Arg Pro His
705   710   715   720

Ser Asn Leu Lys Ser Leu Lys Leu Ile Gly Phe Arg Gly Phe His Phe
                725   730   735

Pro Asn Trp Met Asn Ala Ser Val Leu Lys Asn Val Val Ser Ile Glu
            740   745   750

Ile Glu Cys Glu Asn Cys Trp Arg Leu Pro Pro Phe Gly Glu Leu Pro
        755   760   765

Cys Leu Glu Ser Leu Lys Leu Tyr Asn Gly Ser Ala Glu Val Glu Tyr
    770   775   780

Ile Glu Glu Asp Asp Gly His Ser Thr Leu Lys Phe Pro Tyr Leu Lys
785   790   795   800

Arg Leu Ala Ile Glu Arg Phe Pro Asn Leu Lys Gly Leu Leu Arg Ser
                805   810   815

Glu Gly Glu Glu Lys Phe Ser Met Leu Glu Glu Met Glu Ile Trp His
            820   825   830

Cys Pro Met Phe Val Phe Pro Ala Phe Ser Ser Val Thr Lys Leu Asp

Val Trp Gly Glu Ile Asp Ala Ala Ser Leu Ser Ser Ile Ser Lys Leu
    850   855   860

Thr Thr Leu Thr Ser Leu Ser Ile Asp His Asn Phe Glu Ala Thr Thr
865   870   875   880

Leu Pro Glu Glu Met Phe Lys Arg Leu Val Asn Leu Glu Ser Leu Ser
            885   890   895

Ile Ile Tyr Phe Lys Lys Leu Arg Glu Leu Pro Ser Ser Leu Ala Ser
        900   905   910

Leu Asn Ala Leu Lys Cys Leu Lys Ile His Tyr Cys Tyr Ala Leu Glu
        915   920   925

Ser Leu Pro Glu Gln Gly Met Glu Gly Leu Thr Ser Leu Thr Asp Leu
    930   935   940

Tyr Val Gln Asn Cys Glu Met Leu Lys Cys Leu Pro Glu Gly Leu Gln
945   950   955   960

His Leu Arg Ala Leu Thr Ser Leu Gln Ile Tyr Gly Cys Pro Ala Leu
            965   970   975

Lys Lys Arg Cys Ala Lys Gly Ile Gly Glu Asp Trp His Lys Ile Ala
            980   985   990

His Ile Pro Asn Val Asp Ile Cys
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taaatacata tatctggtat ataattaatt ttttaaagtc atgaagtatg tatcaaatac   180

acatatggaa aaaattaact attcataatt taaaaaatag aaaagataca tctagtgaaa   240

ttaggtgcat gtatcaaata cattaggaaa agggcatata tcttgatcta gataattaac   300

gattttgatt tatgtataat ttccaaatga aggtttatat ctacttcaga ataacaata   360

tacttttatc agaacattca acaaagcaac aaccaactag agtgaaaaat acacattgtt   420

ctctagacat acaaaattga gaaaagaatc tcaaaattta gagaaacaaa tctgaatttc   480

tagaagaaaa aaataattat gcactttgct attgctcgaa aaataaatga aagaaattag   540

acttttttaa aagatgttag actagatata ctcaaaagct attaaggag taatattctt   600

cttacattaa gtattttagt tacagtcctg taattaaaga cacattttag attgtatcta   660

aacttaaatg tatctagaat acatatattt gaatgcatca tatacatgta tccgacacac   720

caattctcat aaaaaacgta atatcctaaa ctaatttatc cttcaagtca acttaagccc   780

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aaaagggctt gtaaaaccct aataaagtgg cactggcaga gcttacactc tcattccatc   900

aacaaagaaa ccctaaaagc cgcagcgcca ctgatttctc tcctccaggc gaaggatccc   960

cgggggatcc ccccaacatc ttacttcatt tcaaaaaata tagattcatt gcgtactcac 1020

aatactct atg gct gaa gct ttc ctt caa gtt ctg tta gac aat ctg act 1070
          Met Ala Glu Ala Phe Leu Gln Val Leu Leu Asp Asn Leu Thr
          1   5   10

tgt ttc atc caa ggg gaa ctt gga ttg att ctt ggt ttt aag gat gag 1118
Cys Phe Ile Gln Gly Glu Leu Gly Leu Ile Leu Gly Phe Lys Asp Glu
15   20   25   30

ttc gaa aag ctt caa agc acg ttt act aca atc caa gct gtg cta gaa 1166
Phe Glu Lys Leu Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu
                35   40   45

gat gct cag aag aag caa ttg aag gac aag gca ata gaa aat tgg ttg 1214
Asp Ala Gln Lys Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu
            50   55   60

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cag aaa ctc aat gct gct gca tat gag gct gat gac atc ttg gac gaa       1262
Gln Lys Leu Asn Ala Ala Ala Tyr Glu Ala Asp Asp Ile Leu Asp Glu
        65              70              75

tgt aaa act gag gca cca att aga cag aag aag aac aaa tat ggg tgt       1310
Cys Lys Thr Glu Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys
        80              85              90

tat cat cca aac gtt atc act ttt cgt cac aag att ggg aaa agg atg      1358
Tyr His Pro Asn Val Ile Thr Phe Arg His Lys Ile Gly Lys Arg Met
95              100             105             110

aaa aag att atg gag aaa cta gat gta att gca gcg gaa cga att aag       1406
Lys Lys Ile Met Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys
        115             120             125

ttt cat ttg gat gaa agg act ata gag aga caa gtt gct aca cgc caa       1454
Phe His Leu Asp Glu Arg Thr Ile Glu Arg Gln Val Ala Thr Arg Gln
        130             135             140

aca gg  tgctcatctt agatatttt ctgaaaaaac agctttatat catcaaattc        1509
Thr Gly


atgtgtgttt tgggaattcg tctaatctaa atgttcgtct caagtctaag tagataagtg      1569

gatccagctt tggatttatt aatctattag ctaaatctgt ttagtgaagt ttttaacata      1629

tataacctca gataaatcca tagcttactc ataggattag gataggcccc caagtctaaa      1689

tgacaggata aagccagagt tgttttagct cttataaatt aacaatgata ataatgtgaa      1749

ttcaaaaaag tgcatttttt taatttgaaa tatttctgct gcttctcaag cttatcattg      1809

tcttttact gtgcaaaatt ctactttgta tttttgctga ctcctaccga gcttgggcca       1869

gg t ttt gtt ttg aat gaa cca caa gtt tat gga aga gac aaa gaa aag       1917
    Phe Val Leu Asn Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys
    145             150             155

gac gag ata gtg aaa atc ctg ata aac aat gtt agc aat gcc caa aca       1965
Asp Glu Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asn Ala Gln Thr
160             165             170             175

ctt cca gtc ctc cca ata ctt ggt atg ggg gga cta gga aag acg act       2013
Leu Pro Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr
        180             185             190

ctt gcc caa atg gtc ttc aat gat cag aga gta att gag cat ttc cat       2061
Leu Ala Gln Met Val Phe Asn Asp Gln Arg Val Ile Glu His Phe His
        195             200             205

ccc aaa ata tgg att tgt gtc tcg gaa gat ttt aat gag aag agg ttg       2109
Pro Lys Ile Trp Ile Cys Val Ser Glu Asp Phe Asn Glu Lys Arg Leu
        210             215             220

ata aag gaa att gta gaa tct att gaa gaa aag tca ctt ggt ggc atg       2157
Ile Lys Glu Ile Val Glu Ser Ile Glu Glu Lys Ser Leu Gly Gly Met
        225             230             235

gac ttg gct cca ctt caa aag aag ctt cgg gac ttg ctg aat gga aaa       2205
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Asp Leu Ala Pro Leu Gln Lys Lys Leu Arg Asp Leu Leu Asn Gly Lys
240                 245             250                 255

aaa tat ttg ctc gtc tta gat gat gtt tgg aat gaa gat caa gat aag    2253
Lys Tyr Leu Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Asp Lys
                260             265             270

tgg gct aag tta aga caa gtc ttg aag gtt gga gca agt ggc gct tct    2301
Trp Ala Lys Leu Arg Gln Val Leu Lys Val Gly Ala Ser Gly Ala Ser
            275             280             285

gtt cta acc act act cgt ctt gaa aag gtt gga tca att atg gga aca    2349
Val Leu Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr
            290             295             300

ttg caa cca tat gaa ttg tca aat ttg tct caa gaa gat tgt tgg ttg    2397
Leu Gln Pro Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu
            305             310             315

ttg ttc atg caa cgt gca ttt ggg cac caa gaa gaa ata aat ctt aat    2445
Leu Phe Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Leu Asn
320             325             330             335

ctt gtg gct atc gga aag gag att gtg aaa aaa tgt ggt ggt gtg cct    2493
Leu Val Ala Ile Gly Lys Glu Ile Val Lys Lys Cys Gly Gly Val Pro
                340             345             350

cta gca gct aaa act ctt gga ggt att ttg cgc ttt aag aga gaa gaa    2541
Leu Ala Ala Lys Thr Leu Gly Gly Ile Leu Arg Phe Lys Arg Glu Glu
            355             360             365

aga cag tgg gaa cat gtg aga gat agt gag att tgg aaa ttg cct caa    2589
Arg Gln Trp Glu His Val Arg Asp Ser Glu Ile Trp Lys Leu Pro Gln
            370             375             380

gaa gaa agt tct att ctg cct gcc ctg aga ctt agt tac cat cac ctt    2637
Glu Glu Ser Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His His Leu
            385             390             395

cca ctt gat ttg aga caa tgc ttt aca tat tgt gca gta ttc cca aag    2685
Pro Leu Asp Leu Arg Gln Cys Phe Thr Tyr Cys Ala Val Phe Pro Lys
400             405             410             415

gat acc gaa atg gaa aag gga aat cta atc tct ctc tgg atg gca cat    2733
Asp Thr Glu Met Glu Lys Gly Asn Leu Ile Ser Leu Trp Met Ala His
                420             425             430

ggt ttt att tta tcg aaa gga aac ttg gag cta gag aat gta ggt aat    2781
Gly Phe Ile Leu Ser Lys Gly Asn Leu Glu Leu Glu Asn Val Gly Asn
            435             440             445

gaa gta tgg aat gaa tta tac ttg agg tct ttc ttc caa gag att gaa    2829
Glu Val Trp Asn Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu
            450             455             460

gtt aaa tct ggt caa act tat ttc aag atg cat gat ctc att cat gat    2877
Val Lys Ser Gly Gln Thr Tyr Phe Lys Met His Asp Leu Ile His Asp
465             470             475

ctg gca aca tct cta ttt tcg gca agc aca tca agc agc aat atc cga    2925
Leu Ala Thr Ser Leu Phe Ser Ala Ser Thr Ser Ser Ser Asn Ile Arg
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gaa ata att gta gaa aat tac ata cat atg atg tcc att ggt ttc act      2973
Glu Ile Ile Val Glu Asn Tyr Ile His Met Met Ser Ile Gly Phe Thr
            500                 505                 510

aaa gtg gta tct tct tac tct ctt tcc cac ttg cag aag ttt gtc tcg      3021
Lys Val Val Ser Ser Tyr Ser Leu Ser His Leu Gln Lys Phe Val Ser
            515                 520                 525

ttg agg gtg ctt aat cta agt gac ata aaa ctt aag cag tta ccg tct      3069
Leu Arg Val Leu Asn Leu Ser Asp Ile Lys Leu Lys Gln Leu Pro Ser
            530                 535                 540

tcc att gga gat cta gta cat tta aga tac cta aac ttg tct ggc aat      3117
Ser Ile Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Ser Gly Asn
    545                 550                 555

act agt att cgt agt ctt cca aac cag tta tgc aag ctt caa aat ctg      3165
Thr Ser Ile Arg Ser Leu Pro Asn Gln Leu Cys Lys Leu Gln Asn Leu
560                 565                 570                 575

cag act ctt gat cta cat ggc tgt cat tca ctt tgt tgt ttg cca aaa      3213
Gln Thr Leu Asp Leu His Gly Cys His Ser Leu Cys Cys Leu Pro Lys
                580                 585                 590

gaa aca agc aaa ctt ggt agt ctt cga aat ctt tta ctt gat ggt tgc      3261
Glu Thr Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Cys
            595                 600                 605

tat gga ttg act tgt atg cca cca agg ata gga tct ttg aca tgc ctt      3309
Tyr Gly Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu
            610                 615                 620

aag act cta agt aga ttt gtg gtg gga att cag aag aaa agt tgt caa      3357
Lys Thr Leu Ser Arg Phe Val Val Gly Ile Gln Lys Lys Ser Cys Gln
    625                 630                 635

ctt ggt gaa tta cga aac ctg aat ctc tat ggc tca att gaa atc acg      3405
Leu Gly Glu Leu Arg Asn Leu Asn Leu Tyr Gly Ser Ile Glu Ile Thr
640                 645                 650                 655

cat ctt gag aga gtg aag aat gat atg gat gca aaa gaa gcc aat tta      3453
His Leu Glu Arg Val Lys Asn Asp Met Asp Ala Lys Glu Ala Asn Leu
            660                 665                 670

tct gca aaa gaa aat ctg cat tct tta agc atg aaa tgg gat gac gat      3501
Ser Ala Lys Glu Asn Leu His Ser Leu Ser Met Lys Trp Asp Asp Asp
            675                 680                 685

gaa cgt cca cgt ata tat gaa tca gaa aaa gtt gaa gtg ctt gaa gct      3549
Glu Arg Pro Arg Ile Tyr Glu Ser Glu Lys Val Glu Val Leu Glu Ala
            690                 695                 700

ctc aaa cca cac tcc aat ctg act tgt tta aca atc agg ggc ttc aga      3597
Leu Lys Pro His Ser Asn Leu Thr Cys Leu Thr Ile Arg Gly Phe Arg
    705                 710                 715

gga atc cgt ctc cca gac tgg atg aat cac tca gtt ttg aaa aat gtt      3645
Gly Ile Arg Leu Pro Asp Trp Met Asn His Ser Val Leu Lys Asn Val
720                 725                 730                 735
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gtc tct att gaa atc atc agt tgc aaa aac tgc tca tgc tta cca ccc        3693
Val Ser Ile Glu Ile Ile Ser Cys Lys Asn Cys Ser Cys Leu Pro Pro
                740                 745                 750

ttt ggt gag ctg cct tgt cta aaa agt cta gag tta tgg agg ggg tct        3741
Phe Gly Glu Leu Pro Cys Leu Lys Ser Leu Glu Leu Trp Arg Gly Ser
                755                 760                 765

gcg gaa gtg gag tat gtt gat tct gga ttc cct aca aga aga agg ttt        3789
Ala Glu Val Glu Tyr Val Asp Ser Gly Phe Pro Thr Arg Arg Arg Phe
                770                 775                 780

cca tct ctg aga aaa ctt aat ata cgc gaa ttt gat aat ctg aaa gga        3837
Pro Ser Leu Arg Lys Leu Asn Ile Arg Glu Phe Asp Asn Leu Lys Gly
                785                 790                 795

ttg ctg aaa aag gaa gga gaa gag caa tgc cct gtg ctt gaa gag ata        3885
Leu Leu Lys Lys Glu Gly Glu Glu Gln Cys Pro Val Leu Glu Glu Ile
800                 805                 810                 815

gag att aaa tgt tgc cct atg ttt gtt att cca acc ctt tct tct gtc        3933
Glu Ile Lys Cys Cys Pro Met Phe Val Ile Pro Thr Leu Ser Ser Val
                820                 825                 830

aag aaa ttg gta gtt agt ggg gac aag tca gat gca ata ggt ttc agt        3981
Lys Lys Leu Val Val Ser Gly Asp Lys Ser Asp Ala Ile Gly Phe Ser
                835                 840                 845

tcc ata tct aat ctc atg gct ctt act tcc ctc caa att cgc tat aac        4029
Ser Ile Ser Asn Leu Met Ala Leu Thr Ser Leu Gln Ile Arg Tyr Asn
                850                 855                 860

aaa gaa gat gct tca ctc cca gaa gag atg ttc aaa agc ctt gca aat        4077
Lys Glu Asp Ala Ser Leu Pro Glu Glu Met Phe Lys Ser Leu Ala Asn
                865                 870                 875

ctc aaa tac ttg aat atc tct ttt tac ttc aat ctt aaa gag ctg cct        4125
Leu Lys Tyr Leu Asn Ile Ser Phe Tyr Phe Asn Leu Lys Glu Leu Pro
880                 885                 890                 895

acc agc ctg gct agt ctc aat gct ttg aag cat ctg gaa att cat agt        4173
Thr Ser Leu Ala Ser Leu Asn Ala Leu Lys His Leu Glu Ile His Ser
                900                 905                 910

tgt tat gca cta gag agt ctc ccc gag gaa ggt gtg aaa ggt tta att        4221
Cys Tyr Ala Leu Glu Ser Leu Pro Glu Glu Gly Val Lys Gly Leu Ile
                915                 920                 925

tca ctc aca cag tta tcc ata aca tac tgt gaa atg cta caa tgt tta        4269
Ser Leu Thr Gln Leu Ser Ile Thr Tyr Cys Glu Met Leu Gln Cys Leu
                930                 935                 940

ccg gag gga ttg cag cac cta aca gcc ctc aca aat tta tca gtt gag        4317
Pro Glu Gly Leu Gln His Leu Thr Ala Leu Thr Asn Leu Ser Val Glu
                945                 950                 955

ttt tgt cca aca ctg gcc aag cgg tgt gag aag gga ata gga gaa gac        4365
Phe Cys Pro Thr Leu Ala Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp
960                 965                 970                 975
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tgg tac aaa att gct cac att cct cgt gtg ttt att tat tagtattccc        4414
Trp Tyr Lys Ile Ala His Ile Pro Arg Val Phe Ile Tyr
            980                     985

aattagatgt aattttctga ttttcttttg gaaacaaatc aactatttgt aagatctatt    4474

tgtattatac ttgatttttc ttgggtctgt aacaataaat atttgaaatt tttcatatta    4534

agattcagaa ttagtcttat agctaacggt atcgggtacc gagctcgaat tcggcttgat    4594

ccaaattttg attttaatgt ttagcaaatg tcctatcagt tttctctttt tgtcgaacgg    4654

taatttagag ttttttttgc tatatggatt ttcgtttttg atgtatgtga caaccctcgg    4714

gattgttgat ttatttcaaa actaagagtt tttgcttatt gttctcgtct attttggata    4774

tcaatcttag ttttatatct tttctagttc tctacgtgtt aaatgttcaa cacactagca    4834

atttggctgc agcgtatgga ttatggaact atcaagtctg tgggatcgat aaatatgctt    4894

ctcaggaatt tgagatttta cagtctttat gctcattggg ttgagtataa tatagtaaaa    4954

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Ile Gln Gly Glu Leu Gly Leu Ile Leu Gly Phe Lys Asp Glu Phe Glu
            20                  25                  30


Lys Leu Gln Ser Thr Phe Thr Thr Ile Gln Ala Val Leu Glu Asp Ala
        35                  40                  45


Gln Lys Lys Gln Leu Lys Asp Lys Ala Ile Glu Asn Trp Leu Gln Lys
    50                  55                  60


Leu Asn Ala Ala Ala Tyr Glu Ala Asp Asp Ile Leu Asp Glu Cys Lys
65                  70                  75                  80


Thr Glu Ala Pro Ile Arg Gln Lys Lys Asn Lys Tyr Gly Cys Tyr His
                85                  90                  95


Pro Asn Val Ile Thr Phe Arg His Lys Ile Gly Lys Arg Met Lys Lys
            100                 105                 110
```

Ile Met Glu Lys Leu Asp Val Ile Ala Ala Glu Arg Ile Lys Phe His
        115   120   125

Leu Asp Glu Arg Thr Ile Glu Arg Gln Val Ala Thr Arg Gln Thr Gly
        130   135   140

Phe Val Leu Asn Glu Pro Gln Val Tyr Gly Arg Asp Lys Glu Lys Asp
145   150   155   160

Glu Ile Val Lys Ile Leu Ile Asn Asn Val Ser Asn Ala Gln Thr Leu
                165   170   175

Pro Val Leu Pro Ile Leu Gly Met Gly Gly Leu Gly Lys Thr Thr Leu
            180   185   190

Ala Gln Met Val Phe Asn Asp Gln Arg Val Ile Glu His Phe His Pro
        195   200   205

Lys Ile Trp Ile Cys Val Ser Glu Asp Phe Asn Glu Lys Arg Leu Ile
    210   215   220

Lys Glu Ile Val Glu Ser Ile Glu Glu Lys Ser Leu Gly Gly Met Asp
225   230   235   240

Leu Ala Pro Leu Gln Lys Lys Leu Arg Asp Leu Leu Asn Gly Lys Lys
            245   250   255

Tyr Leu Leu Val Leu Asp Asp Val Trp Asn Glu Asp Gln Asp Lys Trp
            260   265   270

Ala Lys Leu Arg Gln Val Leu Lys Val Gly Ala Ser Gly Ala Ser Val
    275   280   285

Leu Thr Thr Thr Arg Leu Glu Lys Val Gly Ser Ile Met Gly Thr Leu
    290   295   300

Gln Pro Tyr Glu Leu Ser Asn Leu Ser Gln Glu Asp Cys Trp Leu Leu
305   310   315   320

Phe Met Gln Arg Ala Phe Gly His Gln Glu Glu Ile Asn Leu Asn Leu
            325   330   335

Val Ala Ile Gly Lys Glu Ile Val Lys Lys Cys Gly Gly Val Pro Leu
            340   345   350

Ala Ala Lys Thr Leu Gly Gly Ile Leu Arg Phe Lys Arg Glu Glu Arg
        355   360   365

Gln Trp Glu His Val Arg Asp Ser Glu Ile Trp Lys Leu Pro Gln Glu
    370   375   380

Glu Ser Ser Ile Leu Pro Ala Leu Arg Leu Ser Tyr His His Leu Pro
385   390   395   400

Leu Asp Leu Arg Gln Cys Phe Thr Tyr Cys Ala Val Phe Pro Lys Asp
            405   410   415

Thr Glu Met Glu Lys Gly Asn Leu Ile Ser Leu Trp Met Ala His Gly
            420   425   430

Phe Ile Leu Ser Lys Gly Asn Leu Glu Leu Glu Asn Val Gly Asn Glu
        435   440   445

Val Trp Asn Glu Leu Tyr Leu Arg Ser Phe Phe Gln Glu Ile Glu Val
    450   455   460

Lys Ser Gly Gln Thr Tyr Phe Lys Met His Asp Leu Ile His Asp Leu
465   470   475   480

Ala Thr Ser Leu Phe Ser Ala Ser Thr Ser Ser Ser Asn Ile Arg Glu
            485   490   495

Ile Ile Val Glu Asn Tyr Ile His Met Met Ser Ile Gly Phe Thr Lys
            500   505   510

Val Val Ser Ser Tyr Ser Leu Ser His Leu Gln Lys Phe Val Ser Leu
        515   520   525

Arg Val Leu Asn Leu Ser Asp Ile Lys Leu Lys Gln Leu Pro Ser Ser
    530   535   540

Ile Gly Asp Leu Val His Leu Arg Tyr Leu Asn Leu Ser Gly Asn Thr
545   550   555   560

Ser Ile Arg Ser Leu Pro Asn Gln Leu Cys Lys Leu Gln Asn Leu Gln
            565   570   575

Thr Leu Asp Leu His Gly Cys His Ser Leu Cys Cys Leu Pro Lys Glu
            580   585   590

Thr Ser Lys Leu Gly Ser Leu Arg Asn Leu Leu Leu Asp Gly Cys Tyr

Gly Leu Thr Cys Met Pro Pro Arg Ile Gly Ser Leu Thr Cys Leu Lys
    610   615   620

Thr Leu Ser Arg Phe Val Val Gly Ile Gln Lys Lys Ser Cys Gln Leu
625   630   635   640

Gly Glu Leu Arg Asn Leu Asn Leu Tyr Gly Ser Ile Glu Ile Thr His
                645   650   655

Leu Glu Arg Val Lys Asn Asp Met Asp Ala Lys Glu Ala Asn Leu Ser
            660   665   670

Ala Lys Glu Asn Leu His Ser Leu Ser Met Lys Trp Asp Asp Asp Glu
        675   680   685

Arg Pro Arg Ile Tyr Glu Ser Glu Lys Val Glu Val Leu Glu Ala Leu
    690   695   700

Lys Pro His Ser Asn Leu Thr Cys Leu Thr Ile Arg Gly Phe Arg Gly
705   710   715   720

Ile Arg Leu Pro Asp Trp Met Asn His Ser Val Leu Lys Asn Val Val
            725   730   735

Ser Ile Glu Ile Ile Ser Cys Lys Asn Cys Ser Cys Leu Pro Pro Phe
            740   745   750

Gly Glu Leu Pro Cys Leu Lys Ser Leu Glu Leu Trp Arg Gly Ser Ala
        755   760   765

Glu Val Glu Tyr Val Asp Ser Gly Phe Pro Thr Arg Arg Arg Phe Pro
    770   775   780

Ser Leu Arg Lys Leu Asn Ile Arg Glu Phe Asp Asn Leu Lys Gly Leu
785   790   795   800

Leu Lys Lys Glu Gly Glu Glu Gln Cys Pro Val Leu Glu Glu Ile Glu
            805   810   815

Ile Lys Cys Cys Pro Met Phe Val Ile Pro Thr Leu Ser Ser Val Lys
        820   825   830

Lys Leu Val Val Ser Gly Asp Lys Ser Asp Ala Ile Gly Phe Ser Ser
    835   840   845

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Ile Ser Asn Leu Met Ala Leu Thr Ser Leu Gln Ile Arg Tyr Asn Lys
    850                 855             860

Glu Asp Ala Ser Leu Pro Glu Glu Met Phe Lys Ser Leu Ala Asn Leu
865                 870             875                 880

Lys Tyr Leu Asn Ile Ser Phe Tyr Phe Asn Leu Lys Glu Leu Pro Thr
            885             890                 895

Ser Leu Ala Ser Leu Asn Ala Leu Lys His Leu Glu Ile His Ser Cys
            900             905                 910

Tyr Ala Leu Glu Ser Leu Pro Glu Glu Gly Val Lys Gly Leu Ile Ser
        915             920             925

Leu Thr Gln Leu Ser Ile Thr Tyr Cys Glu Met Leu Gln Cys Leu Pro
    930             935             940

Glu Gly Leu Gln His Leu Thr Ala Leu Thr Asn Leu Ser Val Glu Phe
945             950             955                 960

Cys Pro Thr Leu Ala Lys Arg Cys Glu Lys Gly Ile Gly Glu Asp Trp
            965             970             975

Tyr Lys Ile Ala His Ile Pro Arg Val Phe Ile Tyr
            980             985
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